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SUVREN IN BRAIN-INJURED CHILDREN

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A CHILD'S brain may be damaged by a variety of factors before birth, during the birth process, or in early postnatal life. The results of such damage may affect any of the major functions of the brain, singly or in combination. The major functional spheres affected are: *motor function* (in that case, the term "cerebral palsy" is frequently used); *reasoning and learning ability* (in these children, the term "mental retardation" is applicable); the *special senses* (mainly hearing and vision); *action and behavior;* and the *presence of seizures.*

In this report, we are mainly interested in children whose actions and behavior are significantly different from those of others, presumably because of organic brain damage. In addition to the changes in personality and behavior, they may or may not have various forms of cerebral palsy, may or may not be retarded, have visual or auditory disturbances, or be subject to seizures. As a group, these children are characterized by emotional instability, lack of inhibition, impulsive actions, restlessness, and general hyperactivity.[1 (a)] They are "erratic, uncoordinated, uncontrolled, uninhibited, and socially unaccepted."[1 (b)] The concept of the psychopathology, as well as testing and educational techniques, has been formulated by Strauss and his collaborators.[1, 2]

Chemotherapy.—Attempts to affect these overactive children favorably with medication have in general been unrewarding. The barbiturates usually are not helpful; in fact, they frequently aggravate the restlessness and lack of inhibition. Amphetamine, strangely enough, has been found effective in some cases.[3-5]

Tranquilizing medicines have therapeutic value not only in emotional problems of children[6] but also in brain-injured children, regardless of the level of intelligence or the presence or absence of seizures. Tranquilizers, like chlorpromazine, Rauwolfia compounds, and meprobamate,[4, 5, 7] seem to increase the attention span and facilitate management. Unfortunately, the percentage of beneficial responses is not high and the results are not constant. Nevertheless, the recent advances in the chemotherapy of diseases of the psyche and the central nervous system offer the hope that drugs more effective

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in the treatment of brain-damaged children will be forthcoming. We have been on the alert to determine the possible efficacy of new drugs in this field, especially those with purported different modes of action and pharmacologic effects. One of these drugs that came to our attention was Suvren (captodiamine)* which we feel merits reporting because of the potential it has shown.

Pharmacology.—Noting the sedative effect of diphenhydramine, Weidmann and Petersen[8] altered the molecule to develop and enhance this property. Among the 35 chemicals tested in animals, para-butyl-mercaptobenzhydryl-beta-dimethyl-aminoethyl sulfide hydrochloride (captodiamine) was selected for clinical evaluation because it effected significant sedation without hypnosis, had the least toxicity, and possessed as well musculotropic spasmolytic properties.[9] Because of these pharmacologic effects Suvren seemed to us suitable for clinical investigation in brain-injured children. Furthermore, Bakwin and Bakwin[10] have reported that diphenhydramine itself can be a "valuable therapeutic aid" in the treatment of these patients.

Several papers on its clinical action[11-17] have been published, and others are in press or in preparation.[18, 19] These reports deal primarily with neurotic and psychotic adults. Besides sedation, investigators have observed a mild stimulating action on depressed and melancholic patients[17] and a "loosening up" or antirepressant effect in schizophrenics.[20]

Clientele.—The 40 children treated were outpatients of the Department of Pediatrics of the University of Utah at the Salt Lake County General Hospital (private and clinic), the Children's Health Center of the Utah State Health Department, and inpatients at the Utah State Training School. All met the criteria of Strauss[1] of "brain-injured" and fit into the syndrome recently described by Laufer and Denhoff,[4] Milman,[21] and Bender.[22] The patients varied in age from 2 to 40 years; all but 5 were under 15. There were 23 males and 17 females.

Method.—Forty patients were given Suvren in an attempt to make them more manageable and to decrease their impulsive actions, restlessness, and hyperactivity. Children under 6 years were usually started on 50 mg. twice per day; older patients, three times per day. In many instances it was necessary to increase the dosage to 250 mg. daily to get the desired effect. Almost all children receive 250 mg. at this time. Higher dosages were not used in this group but should be tried in future studies. No attempt at running controls with placebos was made.

Results.—Patients were classified as having a "positive" response when there was a striking improvement in their behavior, when they could be more easily controlled, and their attention span was prolonged. In some of these children the value of the medication was clearly demonstrated by relapses when therapy was temporarily interrupted. The response to Suvren was called "negative" when the desired improvement did not occur or was equivocal. The evaluation was based on reports by parents, teachers, institutional attendants, and physical therapists as well as those of the authors. Twenty-three patients had a positive

*Kindly supplied by Dr. Louis Parrish, Ayerst Laboratories, New York City. Marketed in Europe as "Covatin."

response; 17 showed no or questionable improvement. There did not appear to be any correlation between response and age or sex. Improvement was usually evident within 2 to 5 days on an adequate dosage. Children who did not respond favorably were maintained on Suvren for from 2 weeks to 3 months before being classified as negative and the medication was then discontinued. Some patients have been treated for months with no signs of becoming tolerant or refractory to the medication.

Of the 23 children who had a positive response, 7 had been tried unsuccessfully on one to five other tranquilizers before Suvren was started. In the remaining 16 patients it was the first medication offered. Seven of the children in the negative group had been tried on one to four different tranquilizers or amphetamines with poor results before Suvren was given.

The following case history typifies the patient who had a positive response:

S. W., a 3-year-old girl, had congenital right spastic hemiplegia, a history of three convulsions, and slight mental retardation. The seizures had been controlled with Dilantin, 150 mg., and phenobarbital, 50 mg. daily. (This was continued during the Suvren study.) Physical therapy had been prescribed but could not be carried out because the child would run around the room wildly, turn over, throw around loose objects, and disturb other children in the program. Her attention span was too short to permit her to sit still for passive exercises or to listen to instruction. In the doctor's office on each visit she would throw herself on the floor or try to open the door while screaming.

One week after receiving 150 mg. of Suvren daily, she elected to sit on the examiner's lap, was quiet and affectionate, and cooperated with the therapist. The mother is now able to do her housework and enjoy her home life without having to watch and restrain her daughter continuously. The child falls asleep without struggle soon after being put to bed but does not sleep more hours than before. She is alert and active on awaking in the morning.

Toxicity and Side Effects.—Suvren to date has not been demonstrated to be toxic or to produce significant untoward side effects. Complete blood counts and urinalyses have been done in most cases while the patients were receiving Suvren. A slight or moderate increase in the total leukocyte count without apparent infection was found on one or more occasions in 3 children, and one child had 7 and 8 per cent eosinophils, respectively, on two examinations. No explanation for these mild changes is known, and they may not be related to the administration of the drug. No abnormal urinary findings were noted.

Two brothers whom we attempted to include in this series could not be started on Suvren because they refused to swallow the coated pills, which taste bitter when chewed. One other boy who is not counted in this report vomited each time he took the medication. Lethargy, undue sleepiness, and grogginess were not encountered. No patient developed ataxia, nystagmus, or other neurologic findings while on Suvren; nor was there any evidence that previously present abnormal neurological signs were ameliorated. There was no indication that Suvren affected seizures either favorably or unfavorably. No rashes or other forms of sensitization were noted, even in the children who received interrupted treatment.

DISCUSSION

The results reported here indicate that Suvren is a useful medication in the symptomatic treatment of overactive, brain-injured children. In the series of 40 patients, 23 children who were inattentive, hyperactive, and destructive became amenable to management and instruction. In many of these the response was dramatic, especially in those who had failed to respond to all previous chemotherapy.

The reason for Suvren's efficacy in these patients is not clear. Its reported combination of sedative, stimulating, and "loosening up" effects may provide an explanation. It is impossible to say at this time why Suvren was effective in some cases and not in others. Perhaps, in the future, more specific recommendations as to the selection of cases can be made.

It is true that this effect of stabilization, when achieved, does not solve all problems, but the reduction of hyperactivity and increase in attention span eases the physical and emotional burden on the family or attendants. We do not think that Suvren, tranquilizers, or amphetamines truly increase the I.Q., but amelioration of symptoms often makes the patient more amenable to constructive play and formal education.

A principal advantage of Suvren seems to be its safety, especially the absense of a hypnotic effect. The useful response is not due to sedation and drowsiness but to the reduction in overactivity per se without apparent depression and without affecting the mental alertness of the patient. Because the medical and social problems of brain-injured children are so great and Suvren appears so promising in the easing of their difficulties, we have presented our experience and want to encourage other investigators to use this medication in the same syndrome.

SUMMARY

Forty hyperkinetic children with patterns of organic brain damage were treated with a new type of "mental drug," Suvren. Dosage varied from 100 to 250 mg. daily for periods of 3 to 17 months. Twenty-three patients showed striking improvement in action and behavior.

No significant toxic reactions or untoward side effects were demonstrated.

Our results indicate that Suvren is a safe and useful chemotherapeutic agent in the treatment of hyperactive children with brain damage.

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Could It Have Been the Asiatic Variety?

Epidemic Diphtheric Angina at Lima.—About the close of the month of July, 1851, an epidemic grippe appeared, and suddenly attacked the whole population of Lima, and was fatal, particularly to old people, in consequence of grave pneumonias which were developed in its course. The first cases were observed from the middle to the twenty-four of July, and extended rapidly and simultaneously to all the inhabitants of this city, so that, during the height of the epidemic, the streets were deserted for ten or fifteen days.

Reported in the Gaceta Medica de Lima, July 15, 1858.

THE DIAGNOSIS OF ASTHMA IN INFANCY

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IT IS not unusual to see a baby who wheezes repeatedly with respiratory infections. Some of these have no other signs of allergy, and, after study, no signs of any other condition which might cause the wheezing are found. The questions then come up: Is this asthma? Should we treat him as if it is? The discussion of this problem is the purpose of this paper.

I should like to review some of the characteristics of asthma in infancy as seen in a study of my private patients. Seventy-nine patients with recurrent wheezing, seen before the age of 2 years, have been followed for more than two years. The records of these cases are not a fair sampling of those usually seen by a physician. During the first part of this period only the more severe cases were listed as asthma and the records of the milder ones were lost. During the last ten years I have also recorded the milder cases, but at this time the patients referred were doubtless more seriously affected than the average baby with asthma. Only scratch tests were made on most of these patients, and the intracutaneous tests that were done are not used in this report.

Two deaths occurred among patients seen during this period. One patient was seen only three times, and four years later I had the report of her death; the cause of death was not clear. A 10-month-old baby who had wheezing with respiratory infections, but no other signs of allergy, also died, apparently from an acute febrile disease. I did not see him in his terminal illness, but the autopsy was reported as showing bronchitis with some increase in eosinophils in the exudate around the bronchioles.

Cystic fibrosis of the pancreas was found in one patient. This patient one year later developed a strongly positive test to ragweed, and was worse during the ragweed season. This patient evidently has both fibrosis of the pancreas and asthma.

It was possible to demonstrate the allergic state in one group of 52 babies. Twenty-seven of these at some period showed atopic dermatitis, 34 had strongly positive scratch tests, 7 had obvious clinical response to exposure to some allergen, and 2 patients had many eosinophils in the nasal smear. These babies clearly suffered from asthma.

The second group was composed of 17 patients. These had no definite signs of the allergic state, but had suggestive signs, or what might be called circumstantial evidence. Thirteen of these had respiratory allergy in their immediate family, parents or siblings. Four others showed at least a 6 per cent eosinophilia in the blood.

Ten patients formed the third group, and in these, except for recurrent wheezing, there were no signs of allergy. Asthma seems the logical

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diagnosis, partly because the character and occurrence of the wheezing give the impression of the disease, and partly because treatment on the basis of allergy was effective. These babies with mild wheezing attacks and no other signs of allergy seemed to have the disease in a mild form and under treatment did very well.

It is interesting to compare the results in the three groups. Of the first group, the 52 with demonstrable allergies, 31 (60 per cent) have had some wheezing during the last year of observation. This is not quite as bad as it sounds, as I believe that all are living comparatively normal lives, carrying on at school or work. However, only 40 per cent of these patients are completely well. Of the second group of 17, with only circumstantial evidence of the allergic state, 12 (or 70 per cent) were entirely well for the last year. Of the third group of 10 with no signs of the allergic state, 8 (80 per cent) were entirely well. Statistics on such small numbers are hardly worth recording, but these figures at least do not contradict the idea that wheezing babies with no other signs of allergy have a milder form of asthma.

It is also evident that the more marked the evidences of allergy, the worse the prognosis. Eighteen patients who had eczema gave definite positive scratch tests. Of these, 13 (72 per cent) are still sick, at least to the extent of doing some wheezing during the last year of observation. Nineteen babies had a scratch test strongly positive to egg and, of these 19, all but 2 had some wheezing during the last year.

The records of the 6 most difficult cases in this series were studied. These patients now average 21 years of age, the youngest is 11 and the oldest 33. I found that these difficult-to-treat patients all had eczema and they all had positive tests including a strong reaction to egg when first studied in infancy.

The number of positive skin tests tends to increase with advancing age. Of the patients with negative or doubtful scratch tests, about half of those who were retested a year later showed definite positives. These latter tests were usually positive to inhalants.

A much more striking change was shown in the patients who originally showed positive tests to foods. With these almost invariably the food-positive tests diminished with successive tests and the inhalant-positive tests appeared and increased. These patients who react to foods appear to be better reactors, which probably represents a greater susceptibility to sensitization. In general, the patients with many positive tests, and with strongly positive tests, have more severe symptoms.

It has been stated that, in general, asthma in the beginning shows itself in attacks, with complete clearing in the intervals. This is not true in infancy. Almost half of my patients began with what was apparently a respiratory infection, and then wheezed continuously for a period from one to several months. This is true in both the group with proved allergies and the group without any proved allergies.

The important problem to be decided is the nature of the illness in babies with recurrent wheezing in whom no other pathologic condition can be found and in whom there are

no demonstrable allergies. In favor of the diagnosis of asthma are the following points:

1. The general symptomatology in babies with demonstrable allergies and in those without known allergies is the same, except that in the latter the cases tend to be milder.

2. The babies with at first no signs of allergy other than the wheezing not infrequently develop other signs while under observation. It is not unusual to have a baby improve when in the hospital and become worse on return to his home, presumably because of environmental allergies.

3. Allergy treatment, including control of environment and the injection of vaccines, in most of these doubtful cases is strikingly successful.

SUMMARY

Some of the characteristics of asthma in infancy are reviewed. The attacks of asthma commonly occur with respiratory infections, and in many babies occur only with such infections.

More than half of these babies with recurrent wheezing did not have definitely positive scratch tests.

The babies with positive scratch tests and those with eczema usually had a more severe form of asthma than the others and the prognosis was poorer. Also, the more marked the signs of allergy, as shown by the number and degree of the positive tests and as shown by the severity of the eczema, the more intractable the asthma was likely to be.

The babies who had recurrent attacks of wheezing without other signs of allergy probably suffered from asthma of a lesser degree of severity in which the allergies were not readily demonstrable.

On Prescribing

"Venturesome medication," observes Dr. Hooker, "is captivating, especially to the young and enthusiastic practitioner; and the charm is enhanced by the occasional brilliant achievements with which it is attended. Many of these achievements, however, are only apparent, being erroneously attributed to the remedies, when they are really the result of nature's efforts, and have been effected, perhaps, in spite of the agencies to which the credit is given. While the bold practitioner has this brilliant but often false show of success, the better results of the practice of the cautious physician commonly make but little display; yet, when he does attempt to produce decisive effects by his remedies, so definite is his aim, that the result may be calculated upon almost with certainty."

FROM A PRIZE ESSAY BY WORTHINGTON HOOKER, M.D., NEW HAVEN. PUBLISHED, BOSTON, 1857.

WIDENED ROENTGENOGRAPHIC MEDIASTINAL SHADOW (THYMUS ?) AND ALLERGY IN CHILDHOOD

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THE study of the general characteristics of the allergic infant and child is important, because, if it is suspected that allergic disease is likely to develop, appropriate prophylactic measures may be instituted.[6] Waldbott and Anthony[11] in 1934 reported that in 30 children in whom roentgenograms had shown what was diagnosed as an "enlarged thymus," a follow-up study revealed that 24 were afflicted with an allergic disease and in 4 more such a diagnosis was questionable. Later the same year, Tumpeer[9] also made the observation that roentgen evidence of a widened mediastinal shadow, presumably in most instances indicating an enlarged thymus gland, occurred with significant frequency in children in association with allergic disease. However, he presented no statistical analysis of his series. Waldbott and Anthony[11] and Waldbott[10] drew attention to similarities in the pathological findings between infants dying of anaphylactic shock and infants reported to have died because of an "enlarged thymus." This suggested that so-called "thymic death" is actually death from anaphylactic shock. Carr[3] in 1945, in cases of so-called "thymic death," noted the same type of anatomical and cytological abnormalities as those previously described by these authors. In view of the foregoing, it was felt that, if an unusually broad mediastinal shadow on the roentgenogram could be interpreted as suggestive evidence that one was dealing with an allergic child or a child likely to develop allergies, at least one small facet might be added to the weight of evidence as to whether or not any given infant or young child might eventually develop allergic disease. The opportunity for making such a study presented itself when Simpson and associates[7] began to investigate the late effects with respect to neoplastic disease in those infants who had received roentgen treatment in early infancy for what was thought to be a large thymus gland.

It is important to remember that the great majority of children reported upon by Simpson and associates were diagnosed as suffering from thymic hyperplasia a number of years ago when almost any sudden death in early infancy of which the cause was not immediately obvious was attributed to asphyxia caused by an enlarged thymus gland. Probably the most complete study of this subject is that of Crotti.[5] The signs and symptoms which led one to examine the thymus roentgenographically were

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principally unusual respiratory abnormalities such as variations in the rhythm of respiration, stridors, cyanosis, choking, or any other form of dyspnea. Physicians and the lay public alike were very much concerned with this problem, and, in some hospitals, all newborn infants were routinely subjected to roentgen study for a large thymus gland and some physicians demanded this before elective surgery in children.

The concept that enlargement of the thymus gland may be associated with sudden death has always been received with skepticism by many students of this subject, but the report of the Status Lymphaticus Investigation Committee[13] in 1931 delivered the first really powerful blow to this concept. This Committee concluded that there was no real evidence that the thymus gland was responsible for occasional sudden death. This opinion is generally accepted at the present time. It is not the purpose of this communication to discuss this subject further. Those interested are referred to the observations by Caffey,[2] and the comprehensive studies and reviews by Adelson and Kinney[1] and others.[4, 8, 12] The pendulum in medicine, however, often swings from one extreme to the other until incontrovertible facts are finally established. Until it is definitely shown that angioedema of the thymus gland resulting in death because of pressure on the trachea or the vascular structures at the base of the heart *never* occurs, we feel that an open mind should be kept with regard to this possibility, even though it may be one of the most rare occurrences in medicine.

Our material, which was gathered in the course of the study by Simpson and associates,[7] consists of 614 newborn or very young infants in whom the diagnosis of thymic hyperplasia had been made by the roentgenogram. These cases were taken serially from files made available by radiologists and pediatricians of the city of Rochester, New York. The members of this group were treated by x-ray from two to twenty-seven years prior to 1953. The controls consist of the untreated siblings, and the group as a whole may be considered representative of the heterogenous population of a northern metropolitan American city.

The information relating to the present health of these patients and their untreated sibling controls was obtained largely from a questionnaire sent to the parents. When possible, the information was supplemented by hospital records. It was realized that the questionnaire method of follow-up has many pitfalls, so only three simple questions were asked. These concerned whether or not the patient or a sibling had ever developed bronchial asthma, hay fever, or eczema. No additional questions relative to other possible allergic phenomena or other family history of allergy were posed, and the conclusions were based on the answers to the questionnaire.

The cases are summarized in Table I. Of the 614 children who had been

TABLE I

	NUMBER	PER CENT
Total patients treated for "thymic enlargement"	614	
Patients who subsequently developed allergic disease	173	28.2
Total siblings of patients with "thymic enlargement"	1,287	
Number of siblings who developed allergic disease	106	8.2

treated for what was diagnosed as an enlarged thymus gland, the follow-up study showed that 173, or 28.2 per cent, were later afflicted with one of the above-mentioned major allergic diseases. In the control group of 1,287 siblings, only 8.2 per cent developed such allergic diseases.

COMMENT

It seems fair to state, even though in most instances there were no roentgenograms in the sibling control series, that children who show broad mediastinal shadows roentgenographically, with or without symptoms, which were formerly attributed to an enlarged thymus gland, develop allergic disease significantly more frequently than children who either do not show such a shadow or have had no such symptoms. This brings up the intriguing possibility that symptoms formerly attributed to the presence of an enlarged thymus gland may in fact, in many instances, have been early symptoms of allergic disease. This might, since the symptoms are respiratory in nature, be confirmed by the finding of eosinophils in the postnasal smear or by the therapeutic trial of antiallergic measures such as the use of sympathomimetic drugs, antihistamines, elimination diets, environmental control, etc. The so-called enlargement of the thymus gland may, also, in the allergic or potentially allergic child, be merely a part of the general lymphoid hyperplasia, which characteristically occurs in many allergic children, particularly as regards the tonsils and adenoids.

CONCLUSIONS

The presence of an unusually broad mediastinal shadow presumably due to the presence of an enlarged thymus gland or the presence of respiratory symptoms which could conceivably be attributed to the presence of an enlarged thymus gland is reasonable presumptive evidence that such a child is more likely to develop subsequent allergic disease than a child who does not present such findings.

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GROUP SESSIONS FOR PARENTS OF CHILDREN WITH EPILEPSY

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THE need for a consistent and organized educational program for parents of children with epilepsy has been recognized for some time. The children and parents seen by the psychologist in the Psychiatric Clinic as a part of the integrated service of the Clinic focused attention upon this need. The Jerry Price Seizure Clinic of the Los Angeles Childrens Hospital instituted a program of orientation for parents of children with epilepsy by means of group sessions in March, 1955. This program is believed to be original and the first to be described in this country. Its success and the parent response have been encouraging. We are reporting the outline of the sessions in the hope that such a program, or similar group sessions, might be useful in other clinics.

The primary aim of the group sessions is the correction of prejudice and misunderstanding, and the relief of tension in the parents of children with epilepsy, which is an important part of the over-all therapy. Prior to the institution of group sessions, this function was handled by the physician during the clinic visits. Epilepsy and the principles of its treatment were explained.

The social worker worked with some of the parents at the request of the physician and the psychologist. The psychologist's role was limited to seeing those parents referred to the Psychiatric Clinic by the physician for emotional or intellectual evaluation. In some instances, this was followed by therapy sessions with the psychologist.

The frequency and consistency of questions and problems presented by the parents relative to the care of such children became apparent to the members of the clinic. The presence or absence of serious emotional or intellectual disturbances in the child did not influence the parent's primary concerns. Parents were noted to have concepts of a child's illness clouded by misunderstanding after as much as two years' attendance in the clinic. It was concluded that this phase of the medical care was obviously weak.

The success of group therapy in other fields encouraged us to feel that the technique might be applied to this problem. The concept of group sessions was suggested by the psychologist who is a regular member of the Seizure Clinic staff.

In order that epilepsy might remain the primary subject, it was elected to exclude those parents whose children had, in addition, cerebral palsy, blindness, severe hearing deficiency, diabetes, marked mental retardation, or other gross disorders. It was felt that the group discussions would become too complex if such additional conditions were brought up by the parents.

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There is particular reason to avoid the suggested association of mental retardation and epilepsy to the parent of a child with average intelligence.

OUTLINE OF GROUP SESSIONS

After some experimentation, the following procedure was adopted. Excluding the parents of children with the above-mentioned additional problems, the parents of all new patients to the Seizure Clinic are interviewed by the social worker after the first visit with the doctor. At this time the orientation course is outlined and the importance of regular attendance for the sake of continuity is emphasized. Transportation, "sitter," and working time problems may be involved. If these things can be arranged, an appointment is made for the next available series of sessions.

The course consists of five weekly meetings, lasting from one to one and one-half hours. Registration is limited so that the parents of no more than eight children participate. The atmosphere is that of round-table discussion with questions and interruptions welcomed. At the first two sessions, one of the clinic physicians, a pediatrician as well as an epileptologist, speaks on the medical aspects of epilepsy. At the next two sessions, the psychologist discusses the management of the child, the emphasis being on the child rather than on epilepsy. The focus of the last session is the relationship of the child within the total family group and the community, with the social worker leading the discussion. The psychologist and the social worker are present at all the sessions and have the opportunity to observe those parents who may benefit from additional help on an individual basis.

To encourage the thorough participation of the parents, all distracting factors are eliminated. Observers are excluded, as are the children. It is desirable to keep the situation from reverting to that of the clinic visit or lecture room.

First and Second Sessions.—At the first two meetings of the group sessions, conducted by one of the clinic physicians, the primary purpose is to introduce the parent to the clinic and to give him reliable information concerning epilepsy and its treatment. A brief description of epilepsy and its treatment is outlined. The diagnostic devices and techniques used in arriving at this diagnosis are explained to the parents and their questions are answered. The different kinds of seizures, their frequency and duration are described. The principles of medication and treatment are discussed. That these medications are not habit forming is emphasized especially. The parents are instructed in the care of the child during convulsions.

Parents are encouraged to ask questions whenever they desire. Recurring questions relative to specific aspects of epilepsy will indicate the need for further discussion of particular problems. Typical questions which indicate the primary concerns of parents are as follows: To what extent should physical activity of the child be curtailed? Will the child die in a convulsion? Will he recover? Is epilepsy hereditary? Will the convulsions cause heart damage? Will they lead to nervous or mental illness? What adverse effects, if any, may be expected from the medication?

In the informal discussions it is felt the parent obtains a clearer conception of the problem. Through accurate

specific knowledge he rids himself, to some extent, of prejudices and misconceptions associated with epilepsy, and gets practical help in learning to care for the child. That he is able to share his problems with others in some measure gives the parent support at an important time, that is, when treatment of the child is being instituted and the parent is adjusting to the care of the child with this condition. The group sessions with the physician are essentially factual and informative.

Third and Fourth Sessions.—The psychologist introduces a new phase in parent education and therapy in the third and fourth group sessions. Practical and specific advice on management problems are considered. These two sessions also serve as a screening device for disturbed family situations that could be handled more effectively early in the patient contact with the clinic. The parent is given the opportunity to ventilate his feelings in the group sessions, and he is then encouraged to examine them. Criticism or support from other parents has a salutary effect upon the parent. The psychologist structures these sessions according to the needs of the group.

Two major concerns are consistently apparent in the sessions with the psychologist. Discipline is the primary problem of these parents. Parental insecurity and uncertainty are frequently apparent relative to control of the child's behavior, especially when administration of discipline appears to precipitate a seizure. Discipline is discussed in its general aspects. The parent is encouraged to ask questions about his particular situation. He can thus present his feelings and attitudes to the psychologist who, with the aid of the group, works at making him feel more comfortable with the idea of discipline. He is made more aware of feelings he may have which interfere with discipline. Attitudes are subject to critical inspection and all members of the group are invited to participate in this procedure.

The second most important problem is behavior, normal and abnormal.

Parents of children with epilepsy are sensitive to what they think might be a deviation from the normal. An attempt is made to point out reasons for a child's behavior other than the fact that he has seizures. The object is to allow the parent to accept the idea of individual behavior as a rational part of the growth process in every child, including his own.

Another subject that generally needs discussion is the parent's attitudes and emotional conflicts about epilepsy. The objective atmosphere of discussion and criticism aids the parent in attaining perspective necessary to free himself of unhealthy attitudes. Relieved of these he will be able to offer the child increased emotional support.

Other topics discussed are the fear of convulsions, overprotectiveness, and relations of the child with other children in the family. The child's emotional development is largely a result of the emotional relationships he has within the family, and this is stressed to the parents. The goal of the group sessions with the psychologist is to help the parent accept the problem of his child's having epilepsy more intelligently and objectively. The parent will then be able to give him the necessary emotional support and special care that this particular problem presents.

Fifth Session.—The social worker conducts the fifth and final session of

the group sessions which is concerned with total family life and social adjustments. At this meeting the parents are given suggestions about interpreting the term "epilepsy" to relatives, neighbors, and friends. Information is given about available resources of the community, public school programs, camp facilities, and community groups interested primarily in epilepsy. At the conclusion of this session, parents are given a brochure to take home.

The brochure is written in nontechnical language and is a summary of much of the medical and psychological information covered during the group sessions. It was compiled on the basis of typical parent questions and concerns that had been observed and recorded during the first year of group sessions. The parent is encouraged to read it and to bring back to the clinic further questions he may have. The continuing interest and help of the Social Service Department is emphasized to the parents for any future problems they may have.

SUMMARY

1. At the Jerry Price Seizure Clinic of the Los Angeles Childrens Hospital, the need for a consistent and organized educational program for parents of children with epilepsy was recognized. Customary clinic visits with the doctor were inadequate for this purpose. Courses of group sessions were initiated. This procedure has been carried out for two years and has been found effective in its original aims.

2. It is felt that the parents of children with epilepsy are able through the group sessions to correct their misunderstandings and prejudices and relieve their tensions to some extent.

3. The course is divided into five sessions and attendance is limited to the parents of eight children. The first two sessions are conducted by a physician who is also an epileptologist. At these sessions the physician deals with essentially factual and informative material. He encourages the parents to ask questions and answers them informally. Group discussions are emphasized.

4. The next two sessions are conducted by the psychologist. The two most frequently discussed problems are discipline and behavior. Through discussion and ventilation the parents are helped to accept the problem of the child with epilepsy more intelligently and objectively, resulting in increased emotional support for the child.

5. The final session is conducted by the social worker, who focuses attention upon the child's social relationship and informs the parent of the facilities and services available to them for help with the child. The continuing interest of the Social Service Department in any future problems that may arise is likewise emphasized.

6. It is believed, after a period of more than two years, that the group sessions for parents of children with epilepsy are of material aid and have fulfilled the objectives for which they were designed.

THE TRACE ELEMENT SELENIUM AND ITS INFLUENCE ON DENTAL CARIES SUSCEPTIBILITY

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RESEARCH concerning the influence of trace elements on the susceptibility to dental caries has been mainly confined to the study of fluorine. For the past several years, a great number of studies have appeared in the literature on the different aspects of the fluorine-dental caries relationship. As a result of this, fluoridation of communal water supplies has been accepted as an effective and safe public health measure for the partial protection against dental caries.[1] However, the possibility that other trace elements may play a role, beneficial or harmful, on the degree of susceptibility to dental caries observed among different population groups has not received adequate attention by research workers. That this area presents a promising field for investigation has been indicated from studies conducted with experimental animals.[2-4]

The employment of the epidemiological principles and techniques for the study of dental caries has been recognized as an effective research tool.[5, 6] During the last few years, a number of regional epidemiological studies on dental caries were conducted in Oregon among native-born and -reared children. These investigations were undertaken in 10 counties located east and west of the Cascade Mountain Range, which divides the state of Oregon into two distinct areas from the point of climatology, agriculture, and topography. Furthermore, it is known that the fluoride content of most of the public water supplies of Oregon is negligible.[7] Dental examinations were given to 2,069 children between the ages of 14 and 16 years who were born and had lived continuously in their respective counties. All examinations were performed by one examiner (D. M. H.), a fact which adds uniformity to the collected data. A complete picture of the results of these studies has been presented in the latest article of this series published recently.[8]

One of the outstanding findings of our epidemiological investigations was the existence of a direct relationship between urinary selenium concentration and dental caries prevalence.[9] The results obtained indicated that the trace element selenium may render the teeth more susceptible to dental caries attack. Thus, for the first time, evidence was presented suggesting that a trace element, selenium, may be responsible for increasing caries susceptibility. In view of the above, it was deemed advisable to undertake

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further research for the purpose of eliciting additional knowledge on the selenium-dental caries relationship. This paper gives the results of a second study conducted among Oregon school children on the association between urinary selenium concentration and caries prevalence.

METHODS AND RESULTS

The present investigation on the selenium-dental caries relationship was undertaken among school children living in the counties of Jackson and Josephine of the Southern Oregon Region. The results of a recent epidemiological study, published elsewhere,[10] revealed that children 14 to 16 years of age born and reared in the above-mentioned two counties showed a high degree of susceptibility to dental caries. Moreover, the caries experience among the subjects of both counties was found to be similar, that is, 13.4 D.M.F.* teeth per child in Jackson county and 14.4 D.M.F. teeth per child in Josephine county.*

For the purposes of our study, 24-hour urine specimens were collected from white male high school children who were continuous residents in each of the two counties. Experimental work with laboratory animals has shown that a definite relationship exists between the amount of selenium ingested and the excretion level of this trace element in the urine.[11]

Altogether, 79 urine specimens were collected from both counties. Of these, 33 belonged to children attending the high school of Medford, county seat of Jackson county. The remaining 46 were collected from boys attending the high school of Cave Junction. This school serves families from a rural area in Josephine county. The selection of children for inclusion in the study was done by the principals of the participating high schools, and it was based on their personal knowledge regarding each subject's cooperation and reliability.

Each boy participating in the study was given a one-half gallon Mason jar, and was asked to take it home for collection of a 24-hour urine specimen during the week end. In addition, the subjects were given verbal and written instructions for the proper collection of the urine specimens.

In the determination of urinary selenium the procedures of our first study were followed for digestion, distillation, and precipitation of selenium.[9] Subsequently, the method of Coleman and McCrosky was followed with minor modifications.[12] The selenium was filtered, washed, and the small filtering tubes were transferred to side-arm test tubes. The selenium was then dissolved in 3 ml. of 0.05 per cent bromine in 30 per cent hydrobromic acid and washed into the test tube with 5 ml. water. Excess bromine was reacted with phenol and the selenious acid titrated with 0.001 N thiosulfate and iodine.

The distribution of urinary selenium concentrations among the children included in the present study is given in Table I. The results of the analyses revealed that selenium was present in all the urine specimens collected from the subjects of both counties. The mean urinary selenium concentration of children living in Jackson county was found to be 0.074 p.p.m. and that of subjects in Josephine county 0.076 p.p.m. These values are regarded as being of considerable magnitude and show a definite selenium intake.

*The symbol D.M.F. denotes the number of teeth which are Decayed, Missing, Filled.

TABLE I. DISTRIBUTION OF URINARY SELENIUM CONCENTRATION AMONG CHILDREN LIVING IN JACKSON AND JOSEPHINE COUNTIES OF OREGON

JACKSON COUNTY		JOSEPHINE COUNTY	
SE (P.P.M.)	NUMBER OF SUBJECTS	SE (P.P.M.)	NUMBER OF SUBJECTS
0 – 0.019	3	0 – 0.019	2
0.020 – 0.039	6	0.020 – 0.039	3
0.040 – 0.059	4	0.040 – 0.059	10
0.060 – 0.079	6	0.060 – 0.079	13
0.080 – 0.099	6	0.080 – 0.099	8
0.100 – 0.119	5	0.100 – 0.119	6
0.120 – 0.139	1	0.120 – 0.139	3
0.140 – 0.159	1	0.140 – 0.159	0
0.160 – 0.179	0	0.160 – 0.179	1
0.180 – 0.199	1	0.180 – 0.199	0
Mean 0.074 ± 0.007*		Mean 0.076 ± 0.005*	

*Standard error of the mean.

It is of interest to note that the mean values of urinary selenium excretion among the children of both counties are similar. As it was indicated above, the dental caries experience (mean D.M.F. teeth) of children in the counties of Jackson and Josephine was also found to be similar. In addition, the percentage of subjects in Jackson and Josephine counties with values of urinary selenium excretion above 0.100 p.p.m. is about the same, 24 per cent and 22 per cent, respectively. It thus appears that high prevalence of dental caries is associated with high values of urinary selenium excretion.

DISCUSSION

The results of the present investigation, together with those of our first study, among Oregon school children on the selenium-dental caries relationship provide data which suggest the possibility that this trace element may be responsible for increasing caries susceptibility.

Interest in the trace element selenium by research workers is of relatively recent origin. Selenium became the subject of extensive investigation since it was discovered in the early thirties to be responsible for livestock poisoning in a number of western states. The possible ill effects of selenium intoxication on population groups have been largely unexplored. However, the hazards to health from the continuous daily ingestion of small amounts of selenium have been recognized. Selenium is considered to be a normal constituent of the soil and is absorbed by all vegetation at least in minute amounts. A number of investigations regarding the selenium sources in seleniferous areas revealed the presence of this element in vegetables, cereal grains, foods of animal origin, and water.[13] Since selenium is widely distributed in nature, it is normally present in enamel in small amounts.[14]

In recent years, Lemley[15] and Lemley and Merryman[16] reported on a number of cases of selenium poisoning in human beings that apparently resulted from the daily ingestion of foods grown in seleniferous areas. In one of their patients the presence in his urine of about 0.040 p.p.m. of selenium was considered to be evidence of selenium poisoning. In view of the above, it is of interest to note that in the present study values of urinary selenium excretion of 0.040 p.p.m. and higher were found in the majority of the subjects (Table I). However, it should be mentioned that at the present

time no adequate information is available regarding levels of urinary selenium excretion indicative of selenium poisoning.

The possible relationship between selenium and dental caries susceptibility has not been investigated adequately. Smith and his co-workers conducted two field surveys among people residing in certain seleniferous regions in an attempt to discover symptoms of disease associated with selenium poisoning.[17, 18] They found that "bad teeth, varying from marked discoloration through all stages of decay" was one of the most frequent signs of ill health among the people examined. Dogs treated with two goitrogenic compounds, selenium and thiouracil, showed structural changes in their dentition and jaws.[19] Wheateroft and collaborators[20] investigated the effects of selenium on the dentition of white rats. Selenium was given intraperitoneally to three groups of rats at daily doses of 1 mg., 0.5 mg., and 0.2 mg. per kilogram of body weight together with a cariogenic diet. At the end of the experimental period they observed a trend toward an increase of caries incidence among the animals receiving the most selenium.

It thus appears that in a manner as yet unknown the trace element selenium may be a factor contributing toward an increased susceptibility to dental caries. Undoubtedly, a number of additional studies with experimental animals and human beings are necessary, not only for confirmation of the relationship suggested here but also for an understanding of the exact mechanism through which selenium may exert its harmful effects on teeth.

SUMMARY

An investigation of the possible relationship between the trace element selenium and the degree of susceptibility to dental caries was conducted among Oregon school children.

The findings of the present investigation, as well as those obtained from our first study, indicate that selenium may be a factor responsible for increasing the susceptibility to dental caries attack.

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The Composition of Breast Milk

An infant three months old will take from forty-eight to sixty-four fluidounces daily in six or eight half-pint doses. During the first year therefore he will take from 1000 to 1300 lbs.

What is the composition of this milk? Without entering this long and tedious details, it may be simply said that by the latest and apparently the most exact analysis, its composition is:—

Butter	20.76	1000 lbs. therefore contain	Butter	20.76 lbs.	1300 lbs. therefore contain	Butter	27 lbs.
Casein	14.34		Casein	14.34 "		Casein	18½
Sugar	75.02		Sugar	75.02 "		Sugar	97½
Water	889.88		Water	889.88 "		Water	1157

In 1000 lbs. of milk there are 1.6238 lbs. of salts, or 26 ounces, of which 0.5736 lb., or 9 ounces, are phosphate of lime.

In 1,300 lbs. of milk the salts amount to 2.1 lbs., or 33½ ounces, of which 12 ounces are phosphate of lime.

It thus appears that, during the first year, the child receives from 110 to 143 pounds of dry solids. He may thus readily gain 15 or 20 pounds in weight (implying less than three pounds of dry solids), and yet have a large residue, from 107 to 140 pounds, to be expended in the production of heat and in the activity of an energetic vitality. A child thus nourished can make teeth and bone without difficulty; his functional activity need never be suspended for want of material; atmospheric changes may be successfully resisted, and zymotic diseases will have little power.

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TESTOSTERONE-INDUCED FEMALE PSEUDOHERMAPHRODISM

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SINCE Wilkins and his group[1] established clinical and laboratory evidence that cortisone suppresses the signs and symptoms of congenital adrenal hyperplasia, a great deal of study has resulted in increased understanding of hermaphrodism.

Female pseudohermaphrodism is characterized by an enlarged penislike clitoris, partial or complete fusion of the labia majora in the midline, and a urogenital sinus. Differentiation between congenital adrenal hyperplasia and the nonadrenal forms of pseudohermaphrodism cannot be made on examination of the external genitals. The distinction is made by the demonstration of excessive androgen production in congenital adrenal hyperplasia as evidenced by elevation of the level of 17-ketosteroids and pregnanetriol in the urine.

Patients with nonadrenal female pseudohermaphrodism have normal plasma and urinary 17-ketosteroids and the absence of no abnormal quantities of pregnanetriol in the urine, and at puberty have normal female sexual maturation with menstruation. A total of 14 cases have been described in the literature. In 2 cases[2, 3] the infants were born to mothers with arrhenoblastomas, and it appears that the virilization was a consequence of excessive androgen secretion by the neoplasm. Recently Grunwaldt and Bates[4] and Hayles and Nolan[5] have reported 2 cases of testosterone-induced female pseudohermaphrodism which is similar in many respects to the case to be described. The etiology of the masculinization in the other cases is not known.

This report deals with a case of female pseudohermaphrodism which we believe was induced by the administration of testosterone to the mother during the first trimester of pregnancy. It is the purpose of this paper to emphasize the danger of testosterone administration during the childbearing period.

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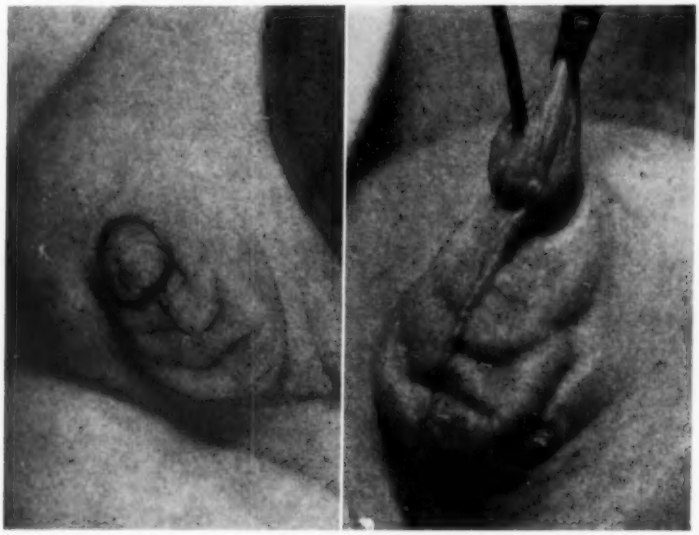
CASE REPORT

History.—K. C. (CH No. 113941), born July 3, 1957, was admitted to the Children's Hospital on Aug. 8, 1957, at 36 days of age. The mother's prenatal course was characterized by low back pain and an orthopedic surgeon was consulted during the first weeks of pregnancy. X-ray examination showed some decrease in mineralization of the vertebrae. After approximately six weeks of pregnancy, the mother was given orally 30 mg. of methyltestosterone and 3.75 mg. of Premarin daily. This medication was administered for a total of six weeks between the seventh and fourteenth weeks of gestation. The mother, therefore, received a total of 1.26 Gm. of methyltestosterone during the first trimester of pregnancy. The remainder of the pregnancy was uneventful except for the fact that during the fourth month the mother fainted, pulling a washtub on her abdomen.

Because of the temporary absence of fetal heart tones, she was hospitalized for a two-day period.

The delivery was normal and the patient weighed 8 pounds at birth. Except for the absence of testes, the genitals had a normal male appearance. The infant was noted to have a large abdominal mass and after unsuccessful catheterization a cystotomy was performed at 2 hours of age; at this time, a double cystic cavity was entered and a biopsy taken. The anterior cavity contained urine; when this was decompressed, the posterior cavity bulged forward. This contained a mucinous fluid. Biopsy from the posterior cystic cavity revealed squamous epithelium consistent with vaginal mucosa. On the fourth day of life a cystogram was performed; during the procedure a membrane ballooned through the urethral meatus which presented at the tip of the phallus. This membrane ruptured spontaneously and urinary drainage was established per urethra. The infant was discharged from the hospital at 10 days of age, but was readmitted at 26 days of age with the clinical pictures of a urinary tract infection. "She" was then transferred to the Children's Hospital.

Physical Examination.—With the exception of the external genitals and a well-healed suprapubic scar, physical examination was essentially normal. Examination of the genitals (Fig. 1, *A* and *B*) showed a phallus measuring approximately 2 cm. in length, with a small central meatus. The corpora of the phallus were felt at the base. The labia were fused in the midline and had a scrotumlike appearance. No gonads could be palpated within the scotum or in the inguinal canal.



A. *B.*

Fig. 1.—*A*, Appearance of external genitals. *B*, Appearance of external genitals. Note catheter in penile urethra.

Laboratory Findings.—The hemogram was essentially normal. Repeated urinalysis showed albumin in amounts up to 4 plus and many white

Fig. 2.—Initial "cystogram," anteroposterior projection. Appearance of double bladder simulated by distended bladder and vagina.

Fig. 3.

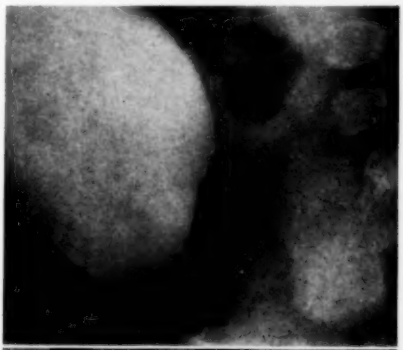


Fig. 4.

A.

B.

Fig. 5.—*A* and *B*, Spot films showing reciprocally varying stages of distention of bladder (anterior), and vagina (posterior) during spontaneous emptying from one into the other.

blood cells. Urine cultures grew *Aerobacter aerogenes, Pseudomonas aeruginosa,* and *Proteus mirabilis.*

Fig. 3.—Spot film during filling of bladder under fluoroscopic control (lateral projection). The catheter has entered a normally located bladder, which is distended by contrast substance. Note the clear space between the posterior border of the bladder density and the vertebral column.

Fig. 4.—Spot film during fluoroscopy after filling of bladder. Compare with Fig. 3. The bladder is now represented by the small shadow of increased density anterior to the large contrast-filled cavity. The latter fills in the area which was clear in Fig. 3. Note proximity of its posterior border to the vertebral column. This filling follows slow, spontaneous contraction of the bladder.

Routine chemistry determinations were within normal limits.

Twenty-four-hour urinary 17-ketosteroids on two occasions were 1.1 and 1.5 mg. and the 17-hydroxycorticoids were 6.3 mg. Repeat studies in another laboratory showed 0.18 mg. 17-ketosteroids and less than 0.1 mg. pregnanetriol per 24 hours.* White blood cells and buccal smears indicated that the patient was of the female genetic sex. An excretory urogram was interpreted as indicating a mild obstructive uropathy with hydroureter and hydronephrosis on the left. A cystogram (Figs. 2, 3, 4, and 5*A* and *B*) showed the presence of two large communicating chambers; these were interpreted as an anterior urinary bladder and a posterior vagina opening into a urogenital sinus. A survey of multiple ossification centers[6] showed normal bone age.

Hospital Course.—The patient was given multiple antibiotics for the urinary tract infection and had a complete clinical and laboratory cure.

Exploratory laparotomy (Fig. 6.) disclosed a dilated bladder and vagina communicating with a urogenital sinus. At the apex of the vagina there were an infantile uterus, tubes, and cystic ovaries. Biopsy specimens taken from each ovary showed immature ovaries with follicle cysts. A partial cystectomy and plastic reconstruction of the urethra were performed.

Fig. 6.—Appearance of normal female internal genitals at laparotomy.

Following these studies, the sex of rearing was changed to female and a clitorectomy and plastic reconstruction of the vagina are planned for some future date.

DISCUSSION

Testosterone administered to the mother during the first trimester of pregnancy appears to be the underlying cause of female pseudohermaphrodism in this patient.

Until recently there had been no adequate explanation for the pathogenesis of nonadrenal pseudohermaphrodism. Wilkins[7] theorized that some masculinizing agent must be present

*Confirmatory determinations were performed by Dr. Alfred Bongiovanni, Children's Hospital of Philadelphia. During the immediate neonatal period the normal urinary output of 17-ketosteroids is 1.2 to 2.5 mg. per day, and this decreases to 0.5 mg. per day by the end of the first month of life. The normal 24 hour urinary excretion of 17-hydroxycorticoids is 3.3 to 9.3 mg. and pregnanetriol is found in trace amounts.

during the critical period when the external genitals were differentiating. He felt that one possible explanation was the temporary overactivity of the fetal adrenal which was subsequently normal at birth. The critical period is during the second and third months of fetal development, for by the fourteenth week the penile urethra has closed as far as the glans.[8] This hypothesis was rejected by Perloff and associates[9] because it failed to explain the renal anomalies in their patient. In the patient described in this paper, the associated renal anomalies can be explained on the basis of mechanical obstruction by the enlarged bladder and vagina.

As further evidence that androgenic products can produce female pseudohermaphrodism, Greene and co-workers[10] have shown that administration of androgenic hormones to pregnant animals will produce genital anomalies in the offspring closely resembling those seen in this patient. Experimentally the production of these anomalies was dependent upon the period of gestation and the amount of androgenic substance given. It has been shown that the androgenic manifestations are limited to the external genitals without apparent effect on the ovaries, tubes, and uterus.

Since testosterone and related products are used extensively in clinical medicine, the possible danger arising from its use during the childbearing age should be carefully weighed.

We wish to thank Dr. A. A. Weech and Dr. F. N. Silverman for their helpful suggestions and encouragement.

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COBALT-INDUCED GOITER WITH CARDIOMEGALY AND CONGESTIVE FAILURE

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SINCE the discovery of cobalt as an integral part of the vitamin B_{12} molecule, its ability to produce remission in various types of anemia has been reported. Particular interest in pediatrics has centered around the treatment of iron deficiency anemia and the anemia of prematurity. Initial reports[1] were favorable, but the danger of toxic effects has been stressed more and more.[2] These toxic effects were first brought to our attention by the story of a child who was referred to a private pediatrician because of difficulty in respiration. The goiter was so large and firm that surgical exploration was done. At biopsy an erroneous impression of a carcinoma was made, and a complete thyroidectomy was performed. The child now requires thyroid replacement therapy and is getting along well. In retrospect the pediatrician accidentally learned that her parents were giving her, on their own, an "iron and cobalt tonic."†

Shortly after this, two other patients with similar complaints were reported by private pediatricians in Louisville. These goiters responded very quickly to the discontinuance of the cobalt and iron preparation which they had been receiving. The fourth case of a similar character has been seen in this clinic.

The fifth case which has come to our attention is the case being reported. The rather widespread use of this preparation among physicians with whom this case has been discussed, despite the reported danger of the indiscriminate use of cobalt-iron preparations, prompted this report.

CASE REPORT

D. P. B., aged 6 months, was referred to the Children's Hospital because of a bulging fontanel. He apparently had been well except for slow weight gain until about one week prior to admission when he had developed low-grade fever, dry cough, and hoarseness. Shortly afterward, tetracycline was prescribed, and after about five days the bulging fontanel was noted.

Past history revealed that the child was the result of a normal term pregnancy, but had gained weight slowly and had been noted to have some rapid respirations. He had been tried on a multitude of formulas including milk substitute formulas, without apparent success. He had always been a slow eater but had never had any vomiting and had had only one bout of mild diarrhea. The family history was noncontributory.

The patient had been diagnosed as having an iron deficiency anemia and

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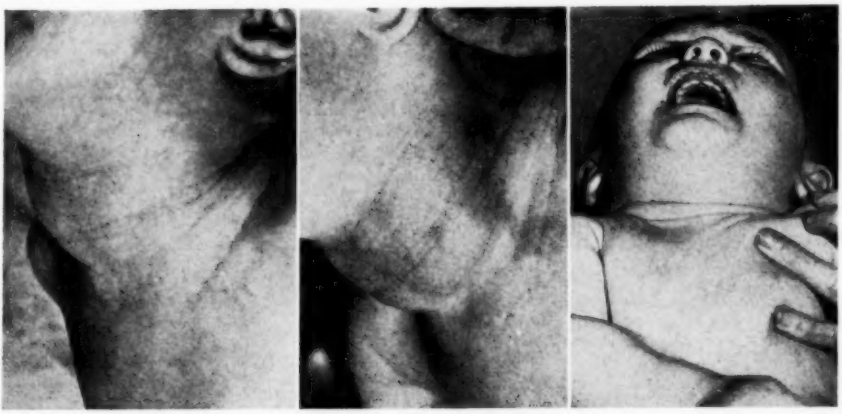
†Roncovite.

had been receiving "iron" therapy for three months.

Physical examination revealed a pale child who was breathing rapidly and appeared chronically ill. He weighed 10 pounds 8½ ounces and was 61 cm. long. His cardiac rate was 120 and his respiratory rate 50 per minute. Blood pressure studies revealed a systolic pressure of 80 mm. Hg by the flush technique, and this pressure did not change appreciably during the hospital stay. The anterior fontanel was noted to be full but not bulging. The skin was somewhat pale and he was cyanotic about his mouth. The extion the rhythm was regular. The heart sounds were faint and distant but no murmur was present. The liver edge was felt 6 cm. below the right costal margin in the right midclavicular line. The spleen was palpable about 3 cm. below the left costal margin in the flank. There were no other masses. The genitalia were considered normal. Reflexes were normal and radial and femoral pulses were easily palpated.

The local physician was contacted and the iron preparation that had been prescribed was Roncovite, one-half dropper full twice a day.



A. *B.* *C.*

Fig. 1.—The tumor (*A*) on admission; (*B*) three weeks later, and (*C*) seven months later.

ternal jugular veins were prominent even when the patient was placed in a forty-five degree position, and a remarkable firm mass was noted to fan out from the midline in the area of the thyroid (Fig. 1, *A*). This mass was firm and movable. No bruit or thrill was noted. The remainder of the ear, nose, and throat examination was negative. The respiratory rate was regular but rapid. The lung fields were clear to percussion. Fine crepitant râles were heard throughout both lung fields. There were no shocks or thrills. The point of maximal impulse was in the fifth intercostal space at the anterior axillary line. On auscultation the rhythm was regular. The heart sounds were faint and distant but no murmur was present. The liver edge was felt 6 cm. below the right costal margin in the right midclavicular line. The spleen was palpable about 3 cm. below the left costal margin in the flank. There were no other masses. The genitalia were considered normal. Reflexes were normal and radial and femoral pulses were easily palpated.

Laboratory examination revealed a red blood count of 6 million and a hemoglobin of 15.3 Gm. (Table I). The white count was 11,600 with 47 per cent neutrophils, 48 per cent lympho-

TABLE I. LABORATORY DATA

DATE	R.B.C. (MILLION/CU.MM.)	HGB. (GM. %)	PBI (μg %)	I^{131} (% UPTAKE)
July, 1956	6.0	15.3		44
September, 1956	3.9	12.5	7.8	45
February, 1957	4.7	11.2		17

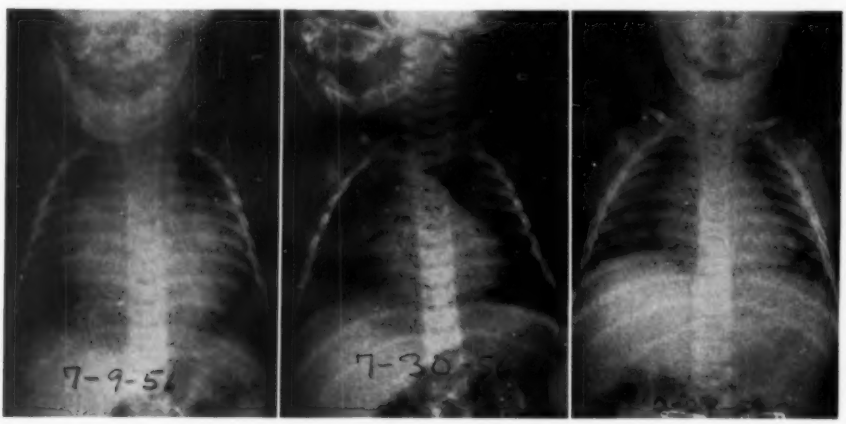
cytes, 4 per cent monocytes, and 1 per cent eosinophils. The urinalysis was essentially normal. The nasopharyngeal culture was of no consequence. A lumbar puncture revealed normal spinal fluid, and during the procedure the child became cyanotic, presumably because of pressure of the mass on the airway.

The patient was given an immediate injection of 0.25 ml. of Mercuhydrin intramuscularly, and digitalization was begun. A chest x-ray confirmed the large globular-shaped heart (Fig. 2, *A*), and cardiac fluoroscopy revealed that the pulsations were of a poor quality. Electrocardiogram obtained on the day after digitalis was begun revealed moderate right ventricular hypertrophy. There was no evidence of low voltage or other signs of a myxedematous heart.

Because of these findings it was felt that this patient might have either idiopathic myocarditis or endocardial fibroelastosis, plus a "Roncovite goiter." The child responded well to initial digitalis and oxygen, and no thyroid therapy was begun. Unfortunately, due to a breakdown in equipment, protein-bound iodine studies were not obtained. A bone age was entirely normal, and a radioiodine uptake study done on the fifth day of hospitalization revealed a 44 per cent, twenty-four-hour I^{131} uptake (Table I).

The patient continued to do very well and was discharged after three weeks' hospitalization. A repeat x-ray taken at the time of discharge showed a remarkable change in the size of the heart (Fig. 2, *B*). Two more electrocardiograms taken during hospitalization revealed right ventricular hypertrophy on the basis of a tall R wave in the right chest leads. Since we had no evidence that this child had a myxedematous heart and there was no evidence of hyperthyroidism except on the basis of the iodine uptake, it was felt that digitalization should be continued and the patient should be returned to the hospital for re-examination in approximately one month.

During the interval the child did well and was readmitted to the Children's Hospital five weeks after the first hospitalization. Physical examination was essentially normal. There was no evidence of thyroid gland involvement (Fig. 1, *B*), and he had gained approximately 2 pounds in weight. Chest x-ray at this time was



A *B.* *C.*

Fig. 2.—Teleorentgenograms of the chest (*A*) on admission, (*B*) three weeks later, and (*C*) seven months later.

considered probably within normal limits. A repeat I^{131} uptake was 44 per cent in twenty-four hours, and the protein-bound iodine was 6.7 micrograms per cent. The red blood count was 3.9 million and the hemoglobin was 12.5 Gm. per cent (Table I). Urinalysis again was essentially normal. The patient was discharged after the digitalis was discontinued.

The youngster was not seen again until approximately six months later. He was admitted to the hospital for repeat studies. At this time his radioiodine uptake was 17 per cent in twenty-four hours (Table I). Electrocardiogram was considered normal and the child's chest x-ray was normal (Fig. 2, *C*). The hemoglobin at the time of this last admission was 11.2 Gm. and the red blood count was 4.7 million (Table I).

DISCUSSION

This patient raises a number of questions which are very difficult to answer. A relationship between the thyroid goiter and the cardiomegaly is difficult to prove, and the elevation of the radioiodine uptake studies only four days after discontinuance of cobalt therapy deserves comment. The rapidity with which this patient's goiter responded to the simple discontinuance of the use of cobalt leaves little doubt that it was the usually described cobalt goiter. The radioiodine uptake, however, in cases with cobalt goiters are usually normal or low. The explanation for this rather high uptake may be that, following withdrawal of Roncovite and removal of this blocking agent, the hyperplastic thyroid which was in a state of iodine-want, increased its iodine uptake without clinical evidence of hyperthyroidism. Repeat studies six weeks later revealed similar findings but the I^{131} uptake had returned to normal in approximately eight months (Table I). This explanation seems justified by the clinical course.

The cardiomegaly, we felt, was due to pericardial effusion. The clinical evidences were distant muffled sounds on auscultation and poor movements on fluoroscopic study. Electrocardiograms, however, revealed no evidence of a pericardial effusion. Neither did they reveal any evidence of myocarditis, myxedematous changes, or hyperthyroidism. The cardiomegaly may not have been related in any way to the thyroid goiter, but the response of the patient, the return of the cardiac size to normal, and the results of electrocardiographic study are difficult to explain on the basis of myocarditis. This response was so closely related to the discontinuance of Roncovite that the temptation to assume a cause-and-effect relationship is great.

Recently Robey and associates[3] reported a case of a cobalt-induced myxedema. An I^{131} uptake done approximately forty-eight hours after discontinuance of cobalt in this case was 69 per cent. Except for the absence of electrocardiographic signs, our patient would fit all the reported clinical characteristics and may be the second such case.

The patient's general response to discontinuance of cobalt, the return of cardiac size to normal, and a normal electrocardiogram indicate a good prognosis. His weight which was below the sixteenth percentile on the Iowa chart when first seen, is now at the fiftieth percentile. His height has changed similarly.

CONCLUSIONS

1. A case of a presumed cobalt-produced goiter is reported.

2. The relationship between the cardiac failure and the thyroid goiter is discussed.

3. The potential hazard of the indiscriminate use of cobalt in patients in whom iron therapy alone is sufficient is further emphasized.

4. The occurrence of a full fontanel following tetracycline therapy is mentioned. This phenomenon has been observed on several occasions.

5. The relative polycythemia as a result of the cobalt therapy is illustrated.

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TUBERCULOUS MENINGITIS IN CHILDREN TREATED WITH ISONIAZIDMETHANESULFONATE

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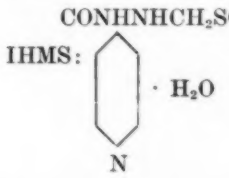
ALTHOUGH the value of isoniazid (INAH) in the treatment of childhood tuberculosis is accepted, it is important to investigate the use of its derivatives. We wish to report on our experience in the treatment of tuberculous meningitis with one derivative, sodium isoniazidmethanesulfonate (IHMS). Previous studies and reports on this derivative have been made by Ceriotti,[1, 2] Logemann,[3] Zamboni,[4] Shimizu,[5] Kitamoto,[6] and Yoshida and associates.[7, 8]



IHMS is a white crystalline powder with a slightly bitter taste. It is 11 to 12 per cent soluble in water at 20° C. On boiling it dissolves into INAH and its dimethansulfonate. It does not combine easily with other substances in vivo, and thus differs from INAH which is apt to acetylize and undergo chemical changes. Its bacteriostatic action in vitro is seemingly somewhat less than that of INAH, but with experimental animals IHMS seems to have a similar or even a little better action. It further has the advantage of lesser toxicity, and hence may be used in larger dosage. Studies of the toxicity made in mice show a toxicity 1/6 to 1/7 that of INAH.

In addition to its clinical use in ten cases of severe tuberculous meningitis discussed below, studies were made (1) of its hemolytic action in vitro, and (2) of its concentration in the blood and cerebrospinal fluid.

1. The hemolytic action of IHMS in vitro is shown in Table I. No hemolysis occurred in cerebrospinal fluid added to IHMS, whether at 37° C. or 10° C., after a period of 24 hours.

2. Ninety-nine determinations were made of the concentration in the blood

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TABLE I. HEMOLYTIC ACTION OF IHMS IN VITRO (37° C., 2 HOURS)

IHMS (%)	0	0.25	0.5	1.0	2.0	4.0	8.0
0	++++	+++	+++	+++	+	–	–
0.2	+++	+++	+++	++	–	–	–
0.3	+++	+++	++	–	–	–	–
NaCl (%) 0.4	+	±	–	–	–	–	–
0.5	–	–	–	–	–	–	–
0.6	–	–	–	–	–	–	–
0.8	–	–	–	–	–	–	–
IHMS (%)	0	0.32	0.63	1.25	2.5	5.0	10.0
Cerebrospinal fluid	–	–	–	–	–	–	–

and cerebrospinal fluid electrophotometrically, using 1-2 naphtochinondisulonacidsodium.[9] A comparison between the blood concentration following oral administration of IHMS and INAH in a dosage of 10/mg./kg. is shown in Fig. 1.

The blood concentration was determined after the administration of larger doses of IHMS (17/mg./kg. and 50/mg./kg.). The concentration increased, paralleling the dosage, but after 24 hours the concentration was low in every instance, averaging around 0.3γ/c.c.

In two patients without symptoms of meningitis the concentration was 0.7 and 0.8γ/c.c. after 3 hours, 1.1γ/c.c. after 6 hours, and 0 and a trace after 24 hours.

CLINICAL STUDIES

After first trying the effect of IHMS in a patient who was not improving on INAH, the study was extended to include 10 cases of tuberculous meningitis. All were severe cases and presented factors disadvantages to therapy.

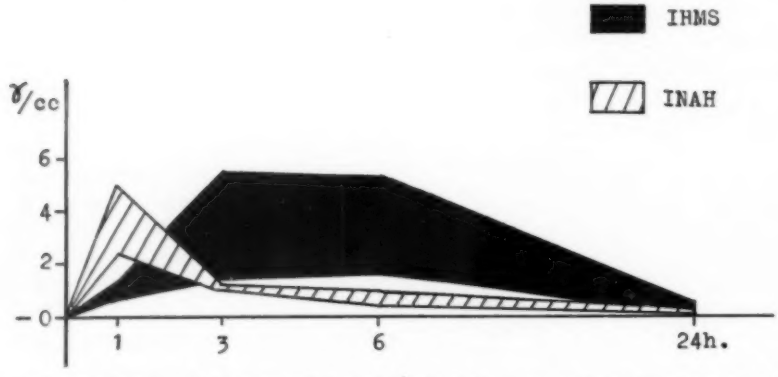

Fig. 1.—Blood concentration of IHMS and INAH after oral administration (dosage of each, 10 mg./Kg.)

Comparison of the blood concentration following intramuscular injection of 10/mg./Kg. with oral administration is shown in Fig. 2.

Studies were made of the concentration in the cerebrospinal fluid following the oral administration of 10/mg./Kg.

The values found in two patients in the recovery stage of tuberculous meningitis were 0.3γ/c.c. after 1 hour, 1.0γ/c.c. and 1.4γ/c.c. after 3 hours, 2.1γ/c.c. after 6 hours, and 0 and a trace at the end of 24 hours.

a. In 5 cases (Cases 1, 6, 7, 9, 10) there was moderate or deep unconsciousness.

b. In 4 cases (Cases 1, 6, 7, 9) treatment had been delayed.

c. In 4 cases (Cases 2, 3, 7, 9) including 3 with recurrent meningitis, there had been previous chemotherapy.

d. In 1 case (Case 4) there was a prolonged clinical course despite streptomycin (SM) and INAH therapy.

The following plan of administration of IHMS was followed. Maximum dosage was reached in a few days and

continued until improvement, when the dosage was either decreased or given at two-day intervals. The maximum was 30-49 mg./Kg. in 4 cases, and 50-160 mg/Kg. in 6. The duration of the treatment in the individual cases is shown in Table II. In addition, as most of the cases were severe, other chemotherapeutic drugs were combined—streptomycin (0.25-0.5 Gm./day intramuscularly, and 20-50 mg./day intrathecally, and PAS, about 0.2 Gm./Kg./day) orally. The total dosage of streptomycin was 0-14 Gm. in 7 patients and 15-30 Gm. in three.

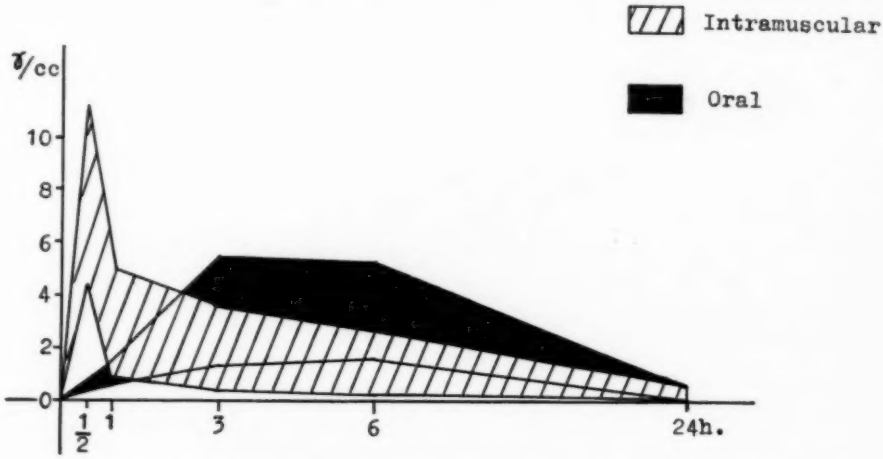

Fig. 2.—Blood concentration of IHMS after intramuscular administration compared with that after oral administration (dosage, 10 mg./Kg.)

The clinical results are summarized in Table II. Seven were cured and three died. In one case (Case 10) slight motor paralysis remained after treatment. Five of the 7 cases have been followed for more than 20 months without relapse. Two of the 3 deaths occurred shortly after the beginning of treatment with IHMS (22 hours and 28 days, respectively), and one patient died more than a year later following the development of encephalitic symptoms which led to the stopping of chemotherapy. In 3 cases ACTH was also used (10-20 units for 1-3 weeks) but no aggravation of the tuberculous lesions due to the use of ACTH could be found.

Brief reports of 4 of the cases are given here.

Case 1.—T. K., aged 2 years and 6 months, was admitted on the thirty-second day of illness. She was somnolent, with left hemiparesis. Nutrition was poor and weight was 7.8 Kg. (78 per cent of standard). Treatment was started with SM (both intramuscularly and intrathecally), PAS, and IHMS in ordinary dosage. At first, slight improvement took place, but on about the 40th day of treatment the condition worsened, and by the 50th she was entirely apathetic. As the general condition was gradually deteriorating, the dosage of IHMS was increased on the 96th day, reaching 160 mg./Kg./day by the 105th day. Of this, 100 mg. was given orally, 50 mg. intramuscularly, and 10 mg. intrathe-

TABLE II. CLINICAL RESULTS

CASE	AGE AND SEX	BEGINNING OF IHMS TREATMENT IN MAXIMUM DOSAGE				DURATION OF MORE THAN 30 MG./KG.	DURATION OF TOTAL TREATMENT	CLINICAL COURSE			PERIOD OF OBSERVATION
		DAYS AFTER OUTBREAK OF ILLNESS	UNCONSCIOUSNESS AND OTHER CONDITIONS	MAXIMUM DOSAGE (MG./KG.)	DURATION			FEVER NORMALIZED FROM APPROX. DAY	NUMBER OF LEUKOCYTES IN CEREBROSPINAL FLUID	RESULTS	
1	2 yr. 6 mo. (♀)	40	++ (Left hemiparesis)	160	At first 14 days; afterward, 8 days	6 mo.	12 mo.	200th	Less than 16 per c.mm. from 246th day	Cured	1 yr., 8 mo.
2	5 yr. 8 mo. (♀)	10	±	40	75 days	8 mo.	1 yr., 6 mo.	85th	Less than 16 per c.mm. from 106th day	Cured	2 yr., 7 mo.
3	3 yr. 4 mo. (♂)	28	–	59	70 days	12 mo.; 4 mo.	1 yr., 8 mo.	200th	Less than 16 per c.mm. from 189th day	Cured	2 yr., 8 mo.
4	1 yr. 9 mo. (♂)	60	– (No tendency to healing after INAH, SM, PAS treatment)	32	57 days	3 weeks × 2; 1 mo. × 1	1 yr., 4 mo.	180th	Less than 16 per c.mm. from 170th day	Cured	2 yr., 4 mo.
5	6 yr. 11 mo. (♂)	36	–	43	140 days	4 mo.	1 yr., 6 mo.	185th	Less than 16 per c.mm. from 129th day	Cured	1 yr., 9 mo.
6	5 yr. 10 mo. (♂)	27	+++ (Left hemiparesis)	70	10 days	7 mo.	8 mo.	Temporarily improved; during treatment encephalitic symptoms aggravated; chemotherapy stopped		Died	1 yr., 3 mo.
7	5 yr. 4 mo. (♀)	21	+++ (Right hemiparesis)	76	⅔ day	⅔ day	⅔ day	Removed in lethal condition. No effect		Died	22 hours
8	9 yr. 5 mo. (♀)	43	–	30	9 weeks; 3 weeks	4 mo.	12 mo.	128th	Less than 16 per c.mm. from 180th day	Cured	12 mo.
9	3 yr. 6 mo. (♂)	39	+++	67	10 days	10 days	13 days	Took large doses of IHMS with ACTH. Fever temporarily alleviated; consciousness recovered; afterward aggravated		Died	28 days
10	1 yr. 11 mo. (♂)	34	++ (Right hemiparesis)	50	3 weeks; 9 weeks	1 mo.; 2 mo.	6 mo.	180th	Less than 24 per c.mm. from 148th day	Cured	10 mo.

eally. Improvement was rapid. The intermittent type of fever which had been reaching 39.5°-40° C. fell to 36.8°-38° C. from the 109th day. Her silence, which had lasted for 40 days, was broken, and her condition took a favorable turn. Complete recovery took place without residuals. The spinal fluid leukocyte count on the 32nd day of the illness was 766. On the 135th day it had fallen to 81, and was less than 20 after the 246th day.

CASE 2.—S. M., aged 5 years and 8 months, had been treated by one of us (H. Y.) three years previously for tuberculous meningitis with SM and PAS, and the present illness was a relapse. IHMS was given orally in a dosage of 40 mg./Kg./day for the first 75 days followed by 30 mg./Kg./day for 6 months. After the 85th day the temperature became normal and improvement in the blood sedimentation rate and in the cerebrospinal fluid took place. After 4 months in the hospital she was discharged in good condition.

CASE 4.—S. N., aged 1 year and 9 months, was treated for 2 months with INAH and PAS orally, combined with SM intramuscularly. The remittent fever continued and the leukocyte count in the spinal fluid was 377. On the 60th day the INAH (8 mg./Kg.) was changed to IHMS (32 mg./Kg.). Improvement followed and the temperature remained normal after the 108th day. He was discharged completely well.

CASE 9.—T. M., aged 3 years and 6 months, was treated with SM, PAS, and IHMS beginning with the 35th day of illness. At first there seemed to be a slight improvement, but the condition soon became worse and encephalitic symptoms developed. Death occurred on the 28th day of treatment.

COMMENT

Although children are regarded as having a better tolerance to INAH than adults, the usual dosage is 8-10 mg./Kg./day. Kleinschmidt[10] has reported liver damage when more than 10 mg. per day was given. Preliminary studies of the hemolytic action of IHMS, and of the blood and spinal fluid concentrations, led to our considering its clinical use. While the concentration in the blood was slower in developing than with INAH, the maximum concentration was almost the same for the two drugs. Furthermore, a high concentration lasted longer with IHMS. The maximum concentration was reached more rapidly when IHMS was given intramuscularly, but fell more rapidly than took place with oral administration. An active diffusion into the cerebrospinal fluid took place even in normal children.

With these preliminary findings as a basis, the clinical use of IHMS in the treatment of tuberculous meningitis was started. The patients were followed with liver function tests (Bromsulphalein, serum bilirubin reaction, serum sublimate reaction, santonin test, and urinary urobilinogen) as well as the blood picture and bleeding time. Nothing was found which was considered as due to the treatment. But we have seen some evidences of liver function damage in the long-term use of large doses of IHMS in the treatment of chronic pulmonary tuberculosis in adolescents.[11] Recently we have been using ACTH in combination with IHMS without evidence of any aggravation of the tuberculous lesions. Taking into consideration the severity of the cases of tuberculous meningitis in which the drug was used, we feel that it was very effective when given in large dosage. The reasons for this are probably the high and persistent blood concentration, together with its good diffusion into the cerebrospinal fluid.

SUMMARY

Isoniazidmethanesulfonate, a derivative of INAH, was used in the treatment of ten children with severe tuberculous meningitis. The clinical results were favorable, and we believe it warrants further trial.

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Some Pertinent Advice for Pediatricians

With regard to the exhibition of drugs as a part of your medical treatment, the golden rule is, *be sparing*. Many remedies you give would make a well person so ill that he would send for you at once if he had taken one of your doses accidentally. It is not quite fair to give such things to a sick man, unless it is clear that they will do more good than the very considerable harm you know they will cause. Be very gracious with children especially. I have seen old men shiver at the recollection of the rhubarb and jalap of infancy. You may depend upon it that half the success of Homoeopathy is due to the sweet peace it has brought into the nursery. Between the gurgling down of loathsome mixtures and the saccharine deliquescence of a minute globule, what tender mother could for a moment hesitate?

FROM AN ADDRESS BY OLIVER WENDELL HOLMES, M.D., DELIVERED IN 1858 TO THE MEDICAL GRADUATES OF HARVARD UNIVERSITY, THE BOSTON MEDICAL AND SURGICAL JOURNAL

WHIRLING AS A CLINICAL TEST IN CHILDHOOD SCHIZOPHRENIA

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THE "whirling" response or test has been described as highly specific for childhood schizophrenia.[1] The test is performed as follows:[1, 2] The child stands with his arms extended, parallel to each other, and with his eyes closed (Fig. 1, *A*). In order that he may be distracted, he is asked to count. The head is now passively rotated to one side as far as possible without discomfort. Reaction is noted and the head is rotated to the other side. The positive response, or whirling, consists of the child's turning his entire body as long as the examiner turns his head (Fig. 1, *B*). The negative response consists of a slight rotation of the trunk but the entire body does not turn (Fig. 1, *C*).

Although the validity and reliability of the whirling test have never been demonstrated, the test is presented in the literature[1-10] not only as a diagnostic aid but as a characteristic sign of childhood schizophrenia. Furthermore, the test has been offered as important evidence for the "maturational lag" concept of childhood schizophrenia.[6, 8, 11]

The purpose of this investigation was to ascertain the value of the whirling test as a diagnostic aid and as confirmatory evidence for the maturational lag concept of childhood schizophrenia. This will be done by (1) reviewing the proposed clinical significance and physiological basis of whirling and its use as evidence for the maturational lag concept of childhood schizophrenia and (2) comparing the incidence of whirling in a group of normal children with the incidence in a group of children with the diagnosis of schizophrenia.

From the Department of Pediatrics, New York University-Bellevue Medical Center.

WHIRLING

Clinical Significance.—Bender[1] and Silver[2] stated that the whirling response is normal up to the age of 6 and that its persistence beyond that age indicates an abnormal condition. Teicher,[12] studying children with behavioral problems, indicated that the response is normal up to the age of 8 years.

Bender[1] regarded the test as highly specific for childhood schizophrenia after the age of 6. She[1] added, however, that it is a very sensitive test procedure for many types of motor disabilities in children. Silver[2, 4] stated that whirling after the age of 6 is seen in childhood schizophrenia, cerebral damage, and reading disabilities. Teicher[12] regarded its persistence after the age of 8 as a pathological response indicating general retardation or organic brain damage.

Physiological Basis.—Both the tonic neck reflex and the neck-righting reflex* have been said to constitute the physiological basis of the whirling phenomenon.

*Both the specificity and the classical reflex character of many of the Magnus "reflexes" have been questioned by Kurt Goldstein.[13]

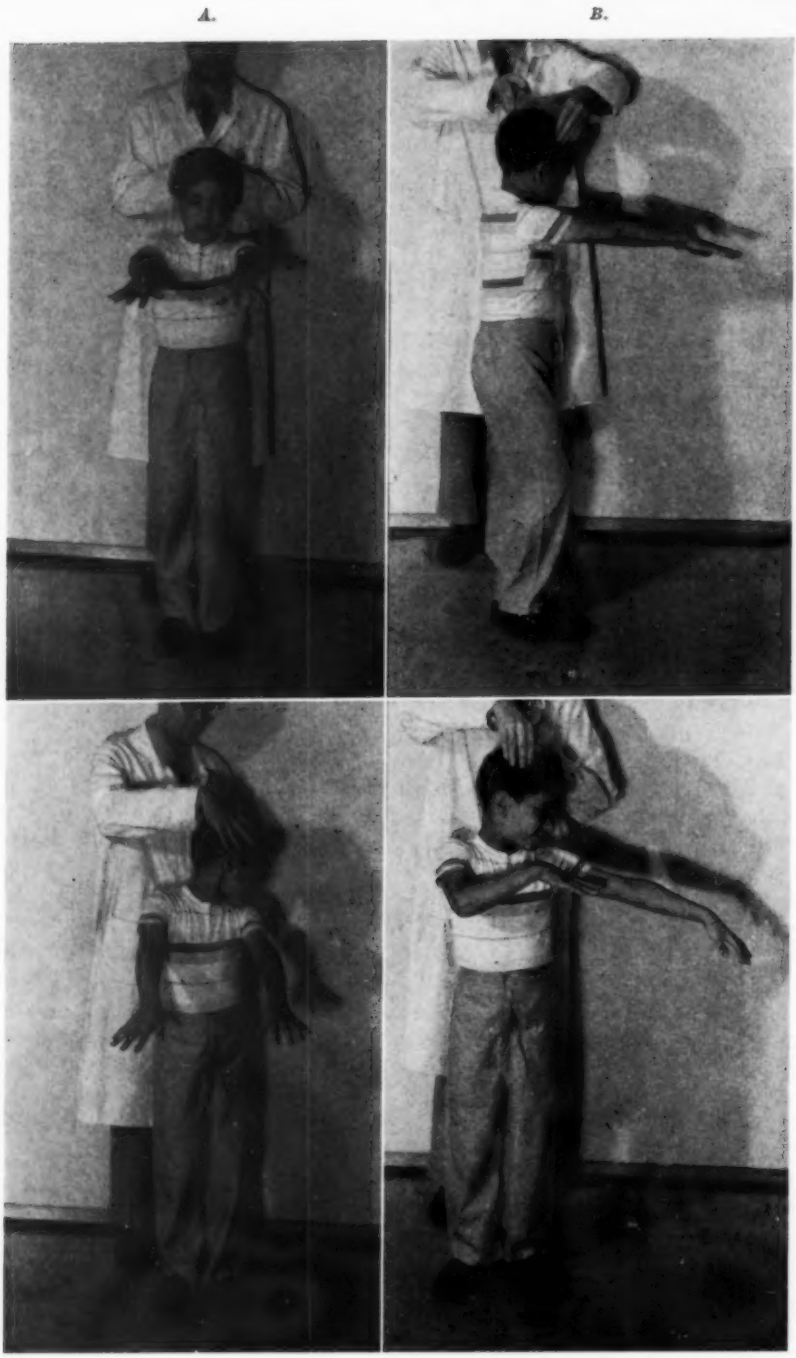

Fig. 1.—"Whirling" test. *A*, Starting position. *B*, Positive response or whirling." *C*, Negative response. *D*, Classical tonic neck position.

Although not specifically stated, it is implied that the classical tonic neck reflex (Fig. 1 *D*) is commonly seen in schizophenic children during the whirling test[2, 14] and this belief has apparently been used as evidence for the concept that the physiological basis of the whirling test is the tonic neck reflex.[5, 6, 8, 10, 15] Bender has stated repeatedly [5, 6, 10, 15] that the whirling response is based on, or is, a primitive tonic neck postural reflex.

The neck-righting reflex was described in animals by Magnus[16] as one of the many postural reflexes which permit an animal to assume and maintain an upright posture. The reflex orients the body in relation to the head. If the head of an animal is turned to the side the body will rotate to bring it to symmetrical alignment with the head. Schaltenbrand,[17] in 1925, was the first to attempt to elicit the neck-righting reflex in human infants and assumed that the response was the same as that described in animals by Magnus. Schaltenbrand stated further that the response normally disappears at about 5 years of age. (Schaltenbrand's work is discussed more fully elsewhere.[18])

Because of the gross similarity between Schaltenbrand's neck-righting reflex in infants and the whirling phenomenon, both Schilder[19] and Silver[2] assumed that the neck-righting reflex is the basis of the whirling phenomenon.

Whirling as Evidence for the Maturational Lag Concept of Schizophrenia.—In 1952 Bender[6] presented her concept of childhood schizophrenia as a "developmental lag at the embryological level, characterized by embryonic plasticity of the biological processes. . . . The biological areas are best defined according to Gesell's concepts describing *The Embryology of Behavior,* namely, homeostatic mechanisms, tonic-neck reflex motor patterning, muscular tone, respiratory patterns, and waking and sleeping with changing states of consciousness."

This theory postulates that childhood schizophrenia is the result of the failure of certain "biological processes" to mature. The schizophrenic child, in the areas mentioned above, is at a stage of development characteristic of the normal fetus. The psychological characteristics of schizophrenia are secondary to this lag in development. The persistence of the whirling response above the age of 6 is a manifestation of immaturity in one of these biological areas: tonic neck reflex motor patterning.

According to Bender there are manifestations of immaturity in the other biological areas outlined by Gesell: soft "doughy" musculature, poor homeostatic control, abnormal speech-respiratory patterns, etc. But whirling is the most accessible to investigation and its presence in a child is readily determined, whereas the presence of many of the other signs of immaturity are difficult to evaluate objectively. Moreover, Bender[6] regarded whirling as one of the most important confirmations of her theory.

WHIRLING IN FOUR GROUPS OF CHILDREN

Subjects and Methods.—The first group consisted of 266 white children from middle-income families. They were from 6 to 11 years old and attended two public schools in Roselle, New Jersey. The second group consisted of 244 Negro children from lower-income families. They were from 5 to 11 years old and attended a large public school in the Harlem section of New York City. All of the

children in the middle-income white population were tested; the regular classes in the lower-income Negro population were randomly sampled.

The third and fourth groups tested were 44 children at Bellevue Hospital and 71 children at Rockland State Hospital, all of whom had had diagnoses of childhood schizophrenia. Bellevue, in attempting to detect less obvious cases of childhood schizophrenia, employs somewhat different diagnostic criteria, and, partly for this reason, its children appeared less disturbed than those at Rockland, many of whom were autistic, and the great majority of whom were obviously psychotic. This is disclosed by the fact that of the 71 children at Rockland only 48 could comply with the test, whereas all of the Bellevue children were in sufficient contact to perform the test adequately. Almost all of the children at Bellevue and an indeterminate number at Rockland had been tested previously. The children were from 6 to 11 years old and were from varied backgrounds.

The children were examined separately and in such a way that no child could have any knowledge of the test beforehand or view any other child taking the test. The test was performed as described above (Fig. 1). Some of the children will continue to rotate or whirl when the head is no longer being turned. This variety of response was designated as "continual whirling" and, as it may be interpreted to represent a more extreme positive response than the usual whirling response, in which the child will stop moving when the head is no longer being turned, this phenomenon was noted when present. In the tabulation of the results, the positives will include both varieties of whirling. Observations were also made for the presence of the classical tonic neck reflex (Fig. 1, *D*).

TABLE I

AGE (YEARS)	NO. TESTED	POSITIVE NO.	POSITIVE %	NO. TESTED	POSITIVE NO.	POSITIVE %
		A. Whirling in Normal Children				
Middle-income Whites.—				*Lower-income Negroes.—*		
5	–	–		32	28	88
6	26	13	50	35	29	83
7	61	31	51	33	24	73
8	41	18	44	36	23	64
9	52	25	48	37	24	65
10	46	15	33	30	13	43
11	40	4	10	41	14	34
		B. Whirling in Schizophrenic Children				
Bellevue.—				*Rockland.—*		
6	–	–		3	3	100
7	6	5	83	4	4	100
8	10	7	70	9	8	89
9	13	9	69	11	10	91
10	7	4	57	12	8	75
11	8	2	25	9	5	56

C. Continual Whirling

	MIDDLE-INCOME WHITES	LOWER-INCOME NEGROES	BELLEVUE SCHIZOPHRENICS	ROCKLAND SCHIZOPHRENICS
Number tested	266	244	44	48
Number positive	8 (3%)	57 (23%)	15 (34%)	22 (46%)

Results.—

Whirling: The results are shown in Table I and Fig. 2. The Rockland schizophrenics had the highest and the middle-income whites the lowest incidence of whirling at every age level tested. These two groups were each significantly different from the two other groups tested and from each other.* Between these two extremes were the Bellevue schizophrenics and the lower-income Negroes. Although the Bellevue schizophrenics were slightly higher than the lower-income Negroes in the sample of the size tested, the difference is not significant.

There is evidence to suggest that the different incidence of whirling in these two normal groups is not a simple function of race and may be explained in part, at least, by the influence of environmental factors: the incidence of whirling in 53 7-year-old and 49 11-year-old Negro children who were in a higher socioeconomic group than the lower-income Negro children was 51 per cent and 55 per cent, respectively. This is significantly different from the incidence in the corresponding ages in the lower-income Negro population.

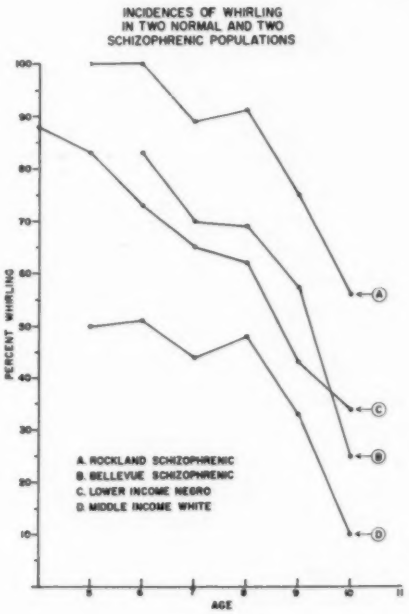

Fig. 2.

There was no significant difference between the incidences of whirling in boys and girls within any of the groups tested.

Continual whirling: Continual whirling was reported in terms of the whole group tested because there was no age trend. The incidence of continual whirling was significantly higher

*The level of significance used throughout this paper is 5 per cent. The method used in comparing the incidence of whirling in the groups as a whole is the sign test because of the small size of the sample in each age group. All other comparisons are made using chi square.

in the lower-income Negroes than in the middle-income whites. The incidence of continual whirling was highest in the two schizophrenic groups but no significance can be attributed to the incidence of continual whirling in these groups because many of the children had been tested previously. (A study of the effect of repeated testing in 47 children disclosed that a child who does not whirl initially will not generally whirl on repeated testing and the converse. However, almost one third of the children who whirl initially will on being tested once or twice more whirl with greater ease and will whirl continually. Continual whirling, therefore, is only a reliable index of the ease of whirling when the child has never been tested previously.

Tonic neck reflex: None of the children in any group showed an unambiguous tonic neck reflex posture. Of the 92 schizophrenic children, 4 showed a posture which slightly resembled a tonic neck reflex; such postures were also seen in the normal groups during performance of the whirling test.

RELATION OF WHIRLING TO NECK-RIGHTING OR TONIC NECK REFLEX

The purpose of this study was to determine whether the same response, i.e., rotation of the body, as seen when the head is turned, could be induced by a completely different stimulus which has nothing to do with head rotation or position.

One crucial modification of the whirling test was made. The child was given identical instructions and began, as in whirling, with his arms outstretched, his eyes closed, and counting aloud. Then instead of turning the head, the examiner grasped the last digit of the middle finger of one hand and drew the arm laterally in an arc to the left side if the left arm was used, or to the right side if the right arm was used. As in the whirling study the child was observed for body rotation.

In this test we were interested in two questions: whether the incidence of whirling—that is, body rotation induced by head turning—would be similar to the incidence of body rotation induced by arm abduction; and also, whether a given child would respond in a similar way to both stimuli.

These tests were done on a group of Negro children from middle-income families.

The first question, whether the incidence of body rotation induced by head turning would be similar to that of body rotation induced by arm abduction was studied in two sixth-grade classes which together had a total of 49 students. Most of the children were 11-year-olds. On a random basis, half of the children, 25, were tested by head turning, and half, 24, by arm abduction.

The second question, whether a given child would respond in a similar way to both stimuli, was tested in two second-grade classes which together had a total of 53 students. Most of the children were 7-year-olds. Each child was tested by both head rotation and arm abduction. Half of the children, 27, were randomly picked to begin with head rotation followed by arm abduction; the other half, 26, with arm abduction followed by head rotation.

Results.—The results may be seen in Table II. The incidence of body rotation induced by head turning was

TABLE II. BODY ROTATION INDUCED BY HEAD TURNING AND ARM ABDUCTION

A. 49 Sixth-grade Children, Either Arm Abducted or Head Rotated in Each Child

RESPONSE	HEAD ROTATION	ARM ABDUCTION
Positive	14 (56%)	14 (58%)
Negative	11	10
Total tested	25	24

B. 53 Second-grade Children, Arm Abducted and Head Rotated in Each Child

RESPONSE		
Negative to both procedures	23	
Positive to both procedures	27	
Total either positive or negative to both	50	(94%)
No. responding differently to arm and head	8	(6%)
Total tested	53	

practically identical with the incidence of body rotation induced by arm abduction. Furthermore, a given child generally responded to both procedures in an identical manner.

Thus the response of body rotation can be induced by a stimulus which has nothing to do with that used in eliciting neck-righting or tonic neck reflexes. The response of whirling, therefore, may have nothing to do with these reflexes, which are generally considered to be specific postural responses determined by head position.

DISCUSSION

Several characteristics of the whirling response make it difficult to conceive of it as a reflex in the classical sense; the whirling response shows great variability between individuals, the stimulus is nonspecific, the latent period is long, there is voluntary control over the response, and repeated testing commonly alters the response.

Whirling is a complicated phenomenon and one can only speculate as to why one child whirls and another does not. Some of these factors may be:

1. General patterns of compliance; a more compliant child may permit his body to be rotated. It was our impression from observing the behavior of the children in the normal groups that this may be one of the most important factors and may partly explain the difference between the Negro children from low-income families and the white children from middle-income families.

2. The child's conscious conception of what he is expected to do; this may depend upon his having seen the test performed on another child or having heard about the test. It may be a kind of projective test in which the child transfers his own attitudes toward authority into the test situation.

3. General postural patterns; a child with a more malleable or adaptable posture may whirl more readily than one with a stiff or rigid posture.

4. Enjoyment of rotational movement; a child who enjoys the sensation of rotating his body may be more likely to whirl.

5. A younger child is generally more likely to whirl. This is probably due to a change in the relative strength of some of the foregoing factors which comes with increasing age.

Several conclusions can be made concerning the whirling response:

1. It is affected by many factors.

2. The same response can be induced by stimuli not connected with neck or head position.

3. It is probably not based on the tonic neck or neck-righting reflex and probably is not itself a reflex.

4. The response, when present, frequently is more easily induced with repeated testing.

5. It is commonly seen in normal children between the ages of 6 and 11, and with decreasing frequency as the age increases.

6. It is commonly although not universally seen in schizophrenic children between the ages of 6 and 11. It is not accompanied by the classical tonic neck reflex.

7. The incidence of whirling appears to be significantly higher in a group of obviously psychotic schizophrenic children (at Rockland State Hospital) than in any normal group of children. In a group of children with the diagnoses of schizophrenia (at Bellevue Hospital), in whom an attempt was made to detect less obvious cases of abnormality, the incidence is slightly but not significantly higher than in a normal lower-income Negro group.

8. The whirling test cannot be employed as a diagnostic sign of mental disease because of the large number of children with mental disease who do not whirl.

9. The whirling response cannot be used as evidence in support of the maturational lag concept of childhood schizophrenia because normal children over 6 years of age commonly exhibit this phenomenon and because there is no evidence that whirling is based on primitive tonic neck reflex patterns.

In view of these considerations, it appears that with our present state of knowledge the whirling test is not a useful test in child psychiatry.

SUMMARY

"Whirling" is a postural test in which the head is turned and the body follows the rotation of the head. It has been claimed that a positive response in a child over the age of 6 indicates mental disease, particularly childhood schizophrenia. In an attempt to evaluate this test, over 700 normal and schizophrenic children were tested. The incidence of whirling in both groups was found to be so high that the test could not be used in establishing a psychiatric diagnosis. The use of the test as evidence in support of the maturational lag theory of childhood schizophrenia is discussed.

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The Health of St. Louis in 1858

The high water of the spring, followed by the extreme heat of the summer, have given rise to an unusual amount of intermittent and remittent disease during the present season, especially in the outskirts and environs of the city. During the hot weather of the latter part of July, and the beginning of August, quite a number of deaths occurred from sunstroke, principally among the intemperate and exposed; the same cause also gave rise to an increased mortality among young children during the same period.

Our hospitals, too, have been well filled with patients, and occasionally a death has taken place from yellow fever imported from New Orleans, but in no instance has this disease originated here, nor spread when introduced into a crowded ward—showing most conclusively its non-contagiousness.

FROM THE ST. LOUIS MEDICAL AND SURGICAL JOURNAL.

CANNULA-SWAB TECHNIQUE FOR OBTAINING VAGINAL SECRETIONS PAINLESSLY IN YOUNG GIRLS

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VAGINITIS in the very young female and prepubescent child is often a source of greater concern to patient and family than it is to the physician. For this reason and because it is important to relieve the mind of the parent as well as to identify if possible the offending organism or foreign body, the simplest and least painful method for securing vaginal material should be employed.

To those who deal with many young females it is common knowledge that the most cooperative child or preteen-ager will become apprehensive at any manipulation in or about the vulva. The insertion of even the thinnest cotton-tipped applicator beyond an introitus that is either small or inflamed or both causes the child pain and irritation great enough to make further examination an unpleasant struggle, not to mention the attendant physical as well as psychological trauma.

On the other hand, it has been my experience that upon proper explanation and reassurance a small sterile metal cannula of medium caliber (14 F.) can readily be inserted into a vaginal orifice of any size with little or no resistance upon the part of the patient. To recover enough secretion, however, even with the aid of a suction bulb, to make a satisfactory smear, culture, or wet mount is difficult when a simple metal catheter is used alone.

The following unit was devised to permit painless and easy insertion of a curved metal No. 14 F. cannula, the end of which is open, round, smooth, and dull. A thin flexible metal applicator with roughened tip to prevent cotton from sliding off in the vagina is then inserted into the cannula and the entire unit autoclaved in that manner. When ready for use, the cannula is readily inserted without lubrication into the smallest vaginal orifice, detecting by contact any hard foreign body such as a hairpin, marble, metal ball, etc. The cannula is then withdrawn to a spot about midway in the vault and the cotton-tipped applicator is gently pushed out to a distance of not more than 2 cm. beyond the end of the cannula, as indicated by a marker on the handle of the applicator which extends well outside the vaginal orifice.

The unit is then rotated in the vault and slowly withdrawn to pick up secretions. The applicator having trapped specimens of the vaginal contents on the way out can then be used for smear, culture, or wet mount; moreover, it can readily be changed into an irrigating cannula if larger amounts of vaginal secretions for cytological or other purposes are desired (i.e., sex chromosome studies). What is more

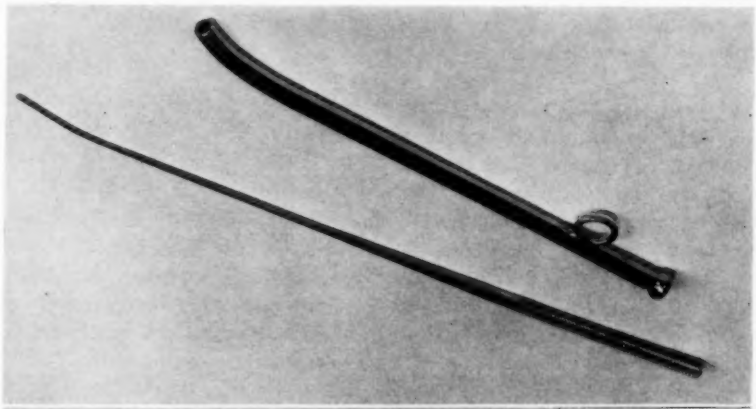

Fig. 1.

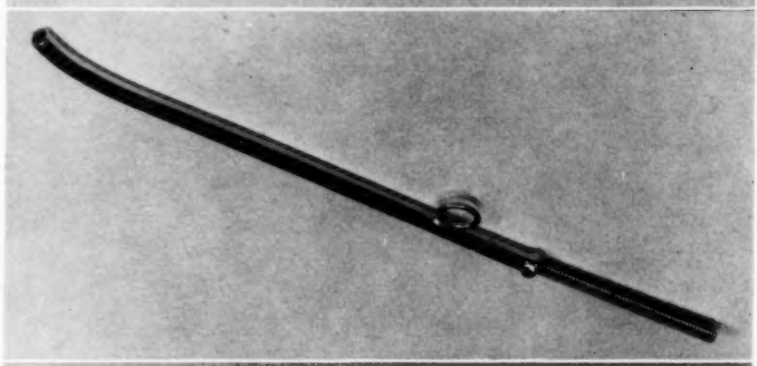

Fig. 2.

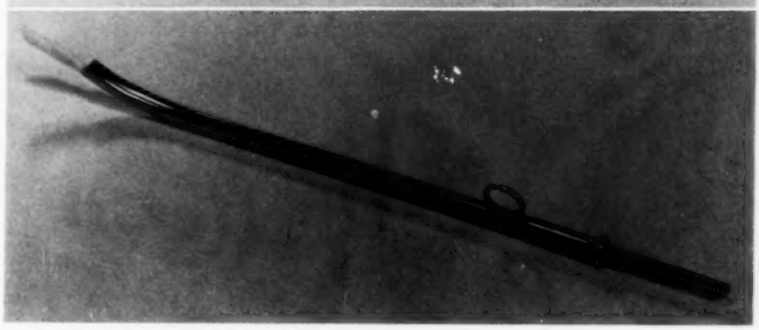

Fig. 3.

Fig. 1.—Unit disassembled, showing cannula and metal applicator with marker on handle.

Fig. 2.—Units assembled, autoclaved, and ready for insertion into vaginal orifice. Cotton-tipped applicator well shielded by metal cannula.

Fig. 3.—Cannula in position within vaginal vault and applicator pushed out beyond cannula tip to a point indicated on handle of applicator. Swab readily rotated with cannula in vault. Unit then withdrawn in this position.

important, however, is that the entire procedure is painless and simple and spares the child a traumatized vulva as well as an unhappy experience.

PURPOSE

The purpose of this type of unit is to avoid the customary pain experienced by most apprehensive little girls undergoing vaginal inspection when even small dry cotton swabs are introduced carefully into a small introitus. Both physical and psychic trauma is great.

METHOD OF USE

The child is shown that the cannula is small, cool, smooth, and painless, and when she is reasonably reassured it is then gently inserted past the vaginal orifice with minimal lubrication. The cannula acts as a painless guide and casing over the cotton tip which is in place but not presenting. The operator gently inserts the cannula into the vagina, feeling for any hard foreign objects in passing. When the cannula is "set," the handle of the applicator is gently pushed past the distal end of the cannula (Fig. 3) to a point not farther than is indicated by the marker on the handle. The unit is then rotated and withdrawn to secure recovery of as much secretion as possible. The unit is then placed in a sterile test tube for laboratory examination. The unit can also be set up for suction and/or irrigation of the vagina if desired (Fig. 4).

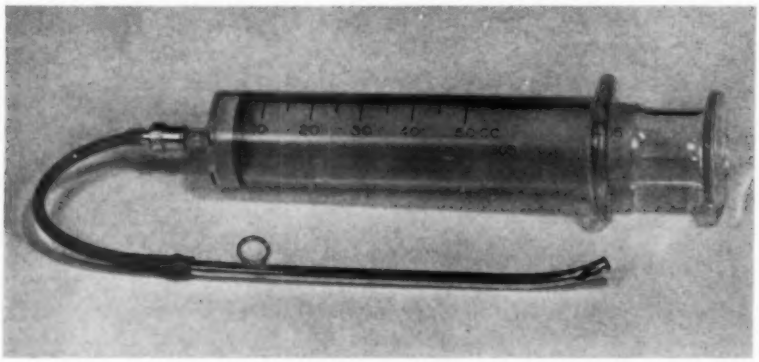

Fig. 4.—Instrument arranged for either suction of vaginal contents or irrigation of the vault.

DESIGN

The metal cannula (Fig. 1) is chrome plated, about 7 inches long, and open at both ends with a slight upward curve at the distal end, size 14 F. There is an "eye" on one side to facilitate painless suction. The flexible metal cotton applicator has a rough tip to secure the cotton and prevent its coming off during manipulation. There is a mark on the handle of the applicator to indicate the distance past which the applicator should not be pushed when in the vagina. The applicator with the cotton tip is set into the cannula (Fig. 2) prior to autoclaving with the cotton not protruding.

CURRENT MANAGEMENT OF STRABISMUS IN CHILDHOOD

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EVANSTON, ILL.

THE pediatrician is immediately consulted for confirmation and advice when a parent, friend, or relative observes malalignment of a child's eyes. Strabismus is a challenging subject, but continuous research and study have brought to light new ophthalmological concepts which are gradually becoming standard procedures.

It has been estimated that 2.7 per cent of children have some form of strabismus.[6] This field, therefore, offers a prime opportunity to practice preventive medicine in the following ways: (1) prevention of the development of amblyopia (failure to develop normal visual acuity in an otherwise normal eye); (2) stimulation of the normal development of fusion (simultaneous use of the two eyes with some degree of depth perception); (3) prevention of psychological problems resulting from cosmetic defects.

The first question to be answered is, "Does the child actually have strabismus?" The average infant develops coordinated eye movements by the end of the third month. The limit of incoordinate ocular movements is about the eighth month. Diagnosis must differentiate it from pseudostrabismus, i.e., epicanthi, narrow interpupillary distance, and negative angle Kappa.[7] A phoria (tendency to deviate from parallelism only when fusion is suspended) must be differentiated from a tropia (deviation present at all times, the fusional reflexes having failed to maintain proper alignment).

The next question is, "Which eye deviates?" There are two classifications: monocular, in which the same eye constantly deviates; and alternating, in which either eye may deviate while the contralateral eye is used to fix the object of regard. This differentiation is of vital importance. It is in the group of monocular strabismus that serious uniocular defects occur and must be recognized in order to determine accurately the final prognosis. An immediate and thorough fundus study of each eye must be performed on a child with strabismus while the pupils are widely dilated. The important pathological processes to be considered are: (1) congenital infections such as syphilis, tuberculosis, and especially toxoplasmosis, which result in destruction of the choroid and overlying retina, particularly in the macular area, destroying potential central vision; (2) congenital malformations of the eye which interfere with the development of vision, i.e., cataract, colobomas, aplasia, and congenital glaucoma; (3) arrested stages of retrolental fibroplasia, which must be ruled out in premature infants, especially where oxygen has been used; (4) the possibility, which is of prime

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importance, that monocular strabismus may be the first sign of an intraocular tumor, especially retinoblastoma; (5) the presence of grossly unequal refractive errors (anisometropia) which prevent the simultaneous perception of similar-sized images on the retina. Any of these conditions alter the prognosis for a lasting cosmetic and functional result. Monocular squinters usually develop amblyopia ex anopsia in the deviating eye. Since the squinting eye receives a different retinal image from that of the fellow eye, diplopia ensues. In young infants, diplopia should be considered, even if strabismus is not obviously apparent, when a head tilt is observed, if one eye is kept closed, or if the child is awkward, stumbles, falls, or overreaches. To prevent confusion, the image of the deviating eye is suppressed and vision does not develop normally in this eye. The amblyopia is the result and not the cause of the squint. The sequence for development of normal distance visual acuity is as follows: 1 year, 20/100 (6/30); 2 years, 20/70 (6/20); 3 years, 20/40 (6/12); 4 years, 20/30 (6/9); and by the fifth year, 20/20 (6/6). Thus an eye which deviates early has a more profound amblyopia than one with a later onset. The results in treatment of amblyopia vary directly with the age at which it is first recognized and treatment initiated. The results are 80 per cent successful when started at the age of 2 years, 60 per cent successful in the 2-4 year age group, and only 40 per cent satisfactory when started in the 4-7 year age group.[2] Beyond 7 years of age, amblyopia is very difficult to overcome, as the abnormal reflexes are more firmly established. In addition, these children so afflicted are of school age, when patching may interfere with schoolwork plus making the child's abnormality definitely apparent to others. The treatment of amblyopia ideally begins as soon as it is recognized in the preschool child. Almost all authors agree that therapy consists of constant occlusion of the better eye. For marked amblyopia, atropine and/or partial occlusion are inadequate. Children will cooperate when the parental attitude is proper. Those who are not treated correctly will develop permanent amblyopia and be potentially handicapped for industrial employment in adult life.

If the strabismus is of the alternating type, either eye is used while the opposite eye is suppressed. Since suppression alternates between the eyes, normal vision develops in each eye, but fusion is totally lacking. Glasses and atropine are of little value in this group. Usually there is no significant refractive error and often the onset is noted shortly after birth. The treatment of this type of strabismus nearly always implies surgical intervention.

The next step involves the direction of the deviation. Esotropia (inward deviation) is the most common. This can be explained on the convergence-accommodation relationship. Hyperopia is common in childhood, but those with excessive hyperopia must exert more accommodation to produce a clear retinal image. The same impulse which activates accommodation likewise produces convergence reflexes, and thus excessive accommodation is associated with excessive convergence, resulting in esotropia. Those with esotropia usually have a significant refractive error and must be examined by cycloplegic methods. Any other method is

totally inadequate. Frequently this deviation responds to glasses partially or wholly. Accommodative esotropia typically is first noted between the ages of 2 and 3 years and is not excessive in amount (15° to 20° or less). Amblyopia is a common occurrence in this condition.

Exotropia (outward deviation) is infrequent under 5 years of age. It may be familial, and these youngsters rarely have significant error of refraction. If present, myopia is the usual type of error. In myopia, accommodation is not necessary for close vision and thus convergence is relaxed and divergence of the visual axis results. The visual acuity is commonly equal in the two eyes.

Vertical deviations (hypertropia) frequently may co-exist with a horizontal deviation. The vertical imbalance may disrupt fusion between the two eyes and make a latent horizontal deviation become manifest to such a degree that the vertical component is overlooked. Unless carefully searched for, the entire treatment may be unsuccessful unless the vertical component also is treated.

The fourth consideration is the search for a paretic ocular muscle. Paretic (nonconcomitant) strabismus is relatively rare in children. Unless there can be demonstrated a definite limitation of motion in one of cardinal directions of gaze, the strabismus is considered to be concomitant, which means that the muscles are capable of moving the eye in all directions, but the coordination between the two eyes is lacking.

If each of the foregoing questions is answered, the strabismus can be properly diagnosed and correct methods of treatment determined. The diagnosis—right, concomitant, accommodative esotropia—says in a concise manner that the child has a nonparalytic strabismus in which the right eye deviates inward, that the onset was around 2 years of age, that it will respond at least in part to glasses, and that the possibility of amblyopia must be carefully considered.

NONSURGICAL MANAGEMENT

As soon as the diagnosis of strabismus is established, a cycloplegic refraction must be done. (There is no satisfactory substitute.) The strength of the lenses prescribed is the maximum correction consistent with reasonable use of the eyes. Higher corrections may be necessary, but, if the glasses will not be worn, they are useless. Even low-power corrections often have an amazing influence upon reducing the angle of squint.[3] Myopic lenses may be prescribed for those with exophoria in order to stimulate convergency. Bifocal lenses have a definite place in the armamentarium of the ophthalmologist for those children whose eyes are straight with glasses for distance but who have strabismus for close work. The additional power of the bifocal lens for near vision often reduces the squint for this range and allows single binocular vision to develop. The bifocals are a temporary measure, and frequently it is necessary to stress this fact to the parents. The use of prisms in glasses is not widespread, except for small vertical deviations. Glasses should be worn for at least three to six months so that their effect may be determined before a decision is reached on other forms of therapy. The refractive status should be checked at regular intervals,

because physical growth alters the requirement for lenses. Hyperopia may continually increase until the age of 7 years.

The use of "drops" has long been known in the medical treatment of accommodative esotropia. Atropine is prescribed on the basis that it paralyzes the ciliary muscle, thereby inhibiting accommodation and influencing the accommodation convergence relationship. Recently, mioties have been substituted for atropine. The rationale for their use is the production of peripheral accommodative spasm, thus eliminating the necessity for accommodative reflexes which would also stimulate convergence. In selected cases of accommodative esotropia the miotic regime has proved valuable.[1] Isoflurophate (Floropryl) ointment in 0.025 per cent concentration is used once every forty-eight hours. There are several reports of iris cysts after prolonged use, but these have subsequently disappeared after the miotic is discontinued.

Occlusion has been discussed previously.

Orthoptics is a term generally misinterpreted. It is often referred to as "exercises," which implies a muscular phenomenon. In reality, orthoptics is a mental education in the binocular skills to overcome amblyopia and improve the fusion status. The ultimate goal of all strabismus cases is a functional as well as a cosmetic result. Orthoptics, however, should be used with discretion, not indiscriminately. Since orthoptics is a learning process it requires attention, concentration, and awareness. Certain fundamental requirements for success with orthoptics are necessary: (1) a good orthoptist (!); (2) a child with at least average intelligence to cooperate (rarely under 4 to 5 years of age); (3) accessibility to an orthoptist so that the child may make office visits several times weekly for several months; (4) parental support and ability to carry out home exercises; (5) vision not less than 20/70 (6/21) in the poor eye; (6) strabismus not more than 30°, without marked limitation of the extraocular muscles; (7) absence of anisometropia (unequal refractive error).[5] The results are best in those cases of strabismus with divergence and postoperatively in monocular strabismus. Orthoptics has no value in pure alternating strabismus and in those cases with hypertropias. One must not expect the impossible from medical treatment; that is why surgical procedures have been devised.

Surgery is indicated in strabismus as soon as it is apparent that nonsurgical methods alone will not produce the desired results. Nothing can be gained by delaying, and a great deal may be lost. Scobee[4] stated that 85 per cent of patients with esotropia require surgery for a functional result. With accurate preoperative studies, the correct muscle(s) should be operated upon with the proper procedure and technique. Surgery aims at not only a cosmetic result but a functional one as well. If vertical and horizontal deviations coexist, the horizontal portion should be corrected first, unless the vertical imbalance is greater than one-half of the lateral. Even though they coexist, they should be handled separately. Surgical procedures are used to place the eyes mechanically in the primary functional position.

In children with large phorias, operation is indicated, but they must be carefully studied preoperatively in

order to avoid overcorrection. Phorias tend to progress into tropias. For this reason, a phoria may need surgical correction early before binocular vision is lost.

Those vertical deviations which exceed ten prism diopters in the primary or reading positions are surgical. Weakening an elevating muscle is preferable to weakening a depressor. Any procedure which alters the ability of a muscle to move the eye into the reading position must be approached with caution, especially recession of the inferior rectus or superior oblique muscles.

The amount of surgery to be done is dependent upon the preoperative measurements, observation under general anesthesia, and actual condition of the muscles as seen at the time of operation. Large, hypertrophic muscles require less surgical manipulation than thin, atrophic muscles to produce the same effect. Anomalous insertions and adhesions will alter the procedure originally intended. There is a definite trend to divide the surgery between the two eyes rather than to perform extensive procedures on one eye which might potentially produce enophthalmos. This is especially true in alternating strabismus. In monocular squint there is no difference in the amount of correction obtained from operation on the deviating eye compared with operation on the nondeviating eye.

The time to operate in concomitant strabismus has been definitely established. So-called "early surgery" (at 3 to 6 years of age) is considered ideal. The purpose of the operation is to place the eyes in that position which permits the development of normal binocular reflexes. Unless it is performed at this age, development of these normal reflexes will not occur and the abnormal ones will become fixed. Advantages of surgery are immediate cosmetic improvement with psychological benefit, less likelihood of amblyopia, increased chance for binocular coordination, and finally, decreased length of treatment. In the past, some based their postponement of operation on the risk of general anesthesia, preferring to wait until local anesthesia could be used. With better anesthetics and qualified anesthesiologists, this objection is no longer valid. In divergent strabismus, operation can be deferred until later childhood, but the tendency toward symmetrical surgery holds for these cases also. Orthoptics plays an important role in those with divergence, but operation is frequently necessary to produce a lasting result.

Continued follow-up care postoperatively is as important as the preoperative work-up. Glasses and orthoptics are equally, if not more, important during this period. Surgical procedure places the eyes in a mechanically straight position, but only continuous expert observation will insure a functional and lasting cosmetic result. Operations are only one part of the treatment, but orthoptics does not cure incorrect surgery.

SUMMARY

The essential points in diagnosis of strabismus have been reviewed. The reasons for early diagnosis and treatment have been stressed. Current concepts in the treatment of amblyopia are elaborated, and intensive and early therapy is recommended. In nonsurgical management the use of mioties is discussed. Preoperative orthoptics

and its limitations are considered. Changing concepts in the advisability of operating during the 3-6-year age group have been reviewed. Intensive postoperative follow-up is necessary to produce functional as well as cosmetically acceptable results.

CONCLUSIONS

Although strabismus management is in the realm of a competent opthalmologist, pediatricians should be aware of the current concepts and the reasoning behind them. Thus they will know the ideal time to refer children with squint to the ophthalmologist and will understand the logic of the recommended therapy.

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GENERALIZED OSTEOMYELITIS IN A NEWBORN INFANT

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MULTIPLE distribution of bony lesions in osteomyelitis in the newborn period being uncommon, the following case is considered of special interest.

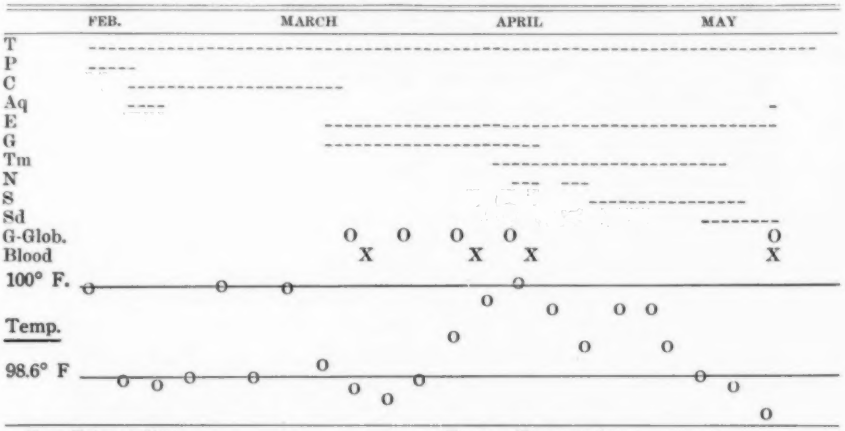
On Jan. 29, 1956, at Gouverneur Hospital, a 5 pound 9 ounce male infant was delivered spontaneously to an Rh-positive gravida vi, para iii, 29-year-old mother. Labor was of seven and three-quarter hours' duration. The infant cried immediately and appeared to be in good condition. Routine care was given.

The mother had attended the antenatal clinic regularly, and no abnormal findings were recorded. Her past history revealed that she had had two premature infants who subsequently expired, one abortion, and her last pregnancy had been complicated by puerperal fever. Her serology was negative on two occasions.

The immediate postnatal period was unremarkable. On the fifth day, a pustular dermatitis developed around the infant's neck and inguinal regions, and then spread to the rest of the body, including the face. On the following day, his right foot became swollen and his appetite was poor. One day later, the swelling had increased and extended to the lower leg. At this time, limitation of abduction of the right leg and weakness of the foot were noticed. He had a temperature of 100.2° F., and a purulent discharge was present at the umbilicus.

From the Pediatric Services of University and Gouverneur Hospitals, New York University-Bellevue Medical Center.

Table I. Therapeutic Chart



T = Tetracycline.
P = Penicillin.
C = Chloromycetin.
Aq = Adrenocortical extract.
E = Erythromycin.
G = Gantrisin.
Tm = Terramycin.
N = Neomycin.
S = Streptonivisin.
Sd = Sulfadiazine.
G-Glob. = Gamma globulin.

Roentgenograms of both legs on the eighth day revealed extensive destruction with periosteal elevation of the proximal end of the right femur (Fig. 1). Treatment with 1.2 million units of aqueous penicillin daily and 125 mg. of tetracycline daily was instituted, and the temperature fell to normal (Table I).

Fig. 1.

Laboratory reports at this time were as follows: Blood culture (February 5) showed *Staphylococcus aureus* highly sensitive to Terramycin, Tetracyn, Aureomycin, neomycin, and Furadantin, and resistant to both penicillin and streptomycin. Blood count (February 6) showed red blood cells, 5.6 million; hemoglobin, 17.6 Gm.; white blood cells 15,700, polymorphonuclears 71, lymphocytes 26, eosinophils 3. Repeat urinalyses were normal.

The patient then began to have frequent periods of cyanosis unrelated to feedings, which promptly responded to oxygen. On February 8 he developed oral thrush, which was almost immediately benefited by Mycostatin. His condition remained essentially unchanged until February 14, when he developed bronchiolitis with progressive respiratory difficulty, and required oxygen continuously. Rapid deterioration occurred and he appeared moribund. Chloromycetin 65 mg. orally four times a day and aqueous adrenocortical extract 5 c.c. initially and 2 c.c. every 4 hours intramuscularly were commenced. On this regimen he slowly improved and both the extract and oxygen were tapered off and then discontinued. Despite his marked clinical improvement, roentgenological findings on February 27 showed extension to the proximal right tibia (Fig. 2).

Although the infant was on Mysteclin (1 capsule daily) and Chloromycetin (250 mg. daily), he again

Fig. 2.

Fig. 3.

developed on March 1 a pustular dermatitis confined to the right leg and scrotum. These lesions immediately responded to Neosporin applied locally.

Laboratory reports were as follows: Culture from skin lesions (March 1) revealed *Staphylococcus aureus;* blood count (March 6) showed hemoglobin 9.5 Gm., white blood cells 31,100, polymorphonuclears 59, lymphocytes 41.

On March 14 (his forty-fourth day), his left hand became swollen and he was placed on erythromycin 125 mg. four times a day and Gantrisin 1.0 Gm. initially and 0.5 Gm. three times a day, in addition to Mysteclin and Chloromycetin which he had been on since shortly after the onset of his illness. Penicillin had been discontinued on February 24 following sensitivity studies. Swelling of the left hand persisted and on March 17 extended to the mid-forearm. X-rays on March 19 showed periosteal proliferation of the proximal ends of the radius and ulna of the right arm. The left arm, however, appeared entirely normal, apart from soft-tissue swelling.

The dosage of erythromycin was increased to 200 mg. three times a day, and the swelling of the left arm gradually subsided, with no subsequent radiological evidence of bone disease (Fig. 3). Palpable diffuse thickening of the clavicles and nodular areas involving the left posterior rib cage, without any sign of local inflammation, then appeared, and the infant's condition became worse. Three transfusions of approximately 50 c.c. each of Group O Rh-positive blood and four 1 c.c. doses of gamma globulin were administered at weekly intervals. In the course of this therapy, and while on Terramycin (30 mg. per pound of body weight), erythromycin (20 mg. per pound), and Mysteclin (tetracycline 35 mg. per pound), the infant again developed a generalized pustular dermatitis and bilateral bronchopneumonia on April 7, his sixty-eighth day. Oxygen was administered for frequent periods of cyanosis and dyspnea, and he was given two seven-day courses of neomycin, 100 mg. three times a day intramuscularly, with some improvement. No evidence of nephrotoxicity was demonstrated on daily urinalyses while he was on this therapy.

Laboratory reports were as follows: Blood culture (April 10) was negative. Blood count (April 17) showed hemoglobin 10.0 Gm., white blood cells 23,200, polymorphonuclears 62, lymphocytes 30, monocytes 6, eosinophils 1, basophils 1. Mantoux test 1:10,000 (April 11) was negative.

Fig. 4.

Biopsy and drainage were considered mandatory as the possibility of a sarcoma had not been ruled out. The patient was therefore transferred to University Hospital on April 24, his eighty-fifth day. On admission, both the right thigh and lower leg showed very large, extremely indurated, fusiform swellings, extending from the hip to above the knee and from below the knee to the ankle (Fig. 4). The skin, although markedly stretched, showed no signs of inflammation. The extraordinary hardness of these two masses convinced several members of the hospital staff that we were dealing

with a sarcoma although there were an equal number of proponents of the diagnosis of osteomyelitis.

The patient was then given a course of Streptonivisin 62.5 mg. four times a day for two weeks, during which time muscle and bone marrow biopsies with culture were performed. These were confirmatory of chronic osteomyelitis, although cultures were negative.

His condition steadily deteriorated, and in spite of aqueous adrenal cortical extract and gamma globulin daily, he died on May 19, 1956.

Necropsy revealed large bony-hard nodular lesions of the right mid-femur and the right tibia, which presented slightly nodular smooth surfaces. On section, the cortical layers of bone were moderately thickened, measuring 2.5 cm. within the femoral and 1.5 cm. within the tibial lesion. The marrow spaces contained spicules of yellow-brown bony tissue and exuded a small amount of slightly turbid blood-tinged fluid. No gross foci of purulent material were noted in either lesion. The clavicular and costal lesions were similar. On microscopic examination, fibrosis of the marrow spaces with minimal chronic inflammatory reaction within the fibrosed areas was present in all the bony lesions. The lumbar vertebrae were not affected.

At the time of autopsy, the process appeared to be relatively quiescent, with death probably resulting from cachexia and an acute bronchopneumonia.

DISCUSSION

A number of cases of osteomyelitis in the newborn infant have been reported. To our knowledge, this is the youngest infant to be described with advanced bone destruction by the eighth day of life.

According to Blanche,[1] the incidence of osteomyelitis has decreased markedly in all age groups except in infants under 1 year. Many authorities stress the differences between osteomyelitis in infants and that in older children. The rapid periosteal proliferation, infrequency of sequestration, and rather rapid resorption when present, were thought by Green and Shannon[2] to be typical of osteomyelitis in infancy. The streptococcus was the most common etiologic factor in their series, although other studies by Green,[3] Blanche, and Thomson and Lewis[4] have found a higher incidence of staphylococcus.

In Green's report, skin infections were incriminated in 27 per cent. The incidence of skin infections in the newborn infant is common, and, as Thomson points out, their potential danger is overlooked because most of them run a benign course.

The etiology of the extensive osteomyelitis in this case was septicemia of the newborn, the portal of entry being twofold. On the fifth day he developed a generalized pustular dermatitis, and on the following day had a purulent umbilical discharge. There was therefore only an interval of three days between the known etiologic process and the positive x-ray findings. The variability between the onset of symptoms and positive roentgenographic evidence has been demonstrated by Self[5] and Ober.[6] Green found the range to be from 3 to 17 days.

Multiple bone involvement occurred in 24 per cent of Green's cases. Caffey[7] stated he had had about the same experience. He reviewed the x-rays in this case and verified the diagnosis of osteomyelitis prior to biopsy; indeed he considered biopsy an unnecessary procedure.

The diagnosis of osteomyelitis was never questioned until shortly before

transfer of the infant to University Hospital. At this time, several members of the staff and other observers remarked on his poor response to therapy and the bone hardness of the swellings. Differentiation of sarcoma from osteomyelitis may be difficult. In this case, however, the patient's age, the multiple lesions, and the early course of the disease, so typical of osteomyelitis in the newborn, militated against the diagnosis of sarcoma.

Treatment necessarily had to be varied and multiple because of the many crises that had to be met during the course of the infant's illness. No agreement exists as to which treatment produces the best results. Nicholson[8] recommends immobilization in full extension and abduction. In general, most orthopedists insist upon early drainage, although the method to be utilized is still disputed. This opinion is not shared by Green, who feels that most cases respond well to early treatment with high doses of multiple antibiotics. The use of antibiotics alone in this case failed to produce the desired result.

SUMMARY

The youngest known newborn infant to have generalized osteomyelitis is presented. In spite of high doses of antibiotics instituted early, the patient died. The importance of treating skin infections in the infant is stressed. Differential diagnosis from sarcoma may be difficult.

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HAMARTOMA OF THE GALL BLADDER IN A CHILD

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PRIMARY tumors of the gall bladder are rare in children. Carcinoma of this structure is so rare under the age of 20 that our search revealed only three reported cases. Two girls were operated upon in Chile,[1] one at 17 years, and one at 14 years of age. One case was reported from Sweden[2] in a 13-year-old girl. We found no report of any type of benign tumor of the gall bladder.

Hamartomas were so named by Albrecht[3] in 1904 as "those tumor-like malformations of development in which the various tissues of a part are present in improper proportions or distributions, with prominent excess of one particular tissue." Gross[4] regards them as a development of abnormally placed tissues attempting to form substance of the parent organ, but not achieving the completely normal pattern. Potter[5] states that, except for teratomas, practically all masses present at birth and which we ordinarily describe as benign neoplasms should be included under the term "hamartoma." This includes most hemangiomas, lymphangiomas, benign pigmented moles, the neurofibromata of von Recklinghausen, adenomas of the liver, rhabdomyomas of the heart, and the cartilage-capped exostoses.

Benson and Pemberthy[6] have reported the successful removal of a hamartoma of the liver from a 7-month-old infant. Hamartomas of the lungs in children have been described, and these often showed characteristic dispersion of calcification which facilitates x-ray diagnosis. We found no reported instance of hamartoma of the gall bladder.

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Presented at the Pediatric Section Meeting, Henry Ford Hospital Alumni Reunion, Detroit, June 1, 1957.

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CASE REPORT

Michael A., a 7-year-old white boy, had been followed for three years because of a spastic quadriplegia believed due to Pelizaeus-Merzbacher's disease, a diffuse brain sclerosis associated with demyelinization of the white matter. This diagnosis[7] had been made at autopsy in two sisters who had died earlier, following a paralytic course similar to that of our patient. A maternal aunt of the patient had died of a similar condition. No special treatment for the disease is known, and none had been tried in our case. His survival this long was due almost entirely to the meticulous care provided by his mother. A brother, now 15, is apparently normal.

During an interval examination in June, 1955, an egg-sized mass was felt in the abdomen near the hepatic flexure of the colon. Over the next month this became enlarged to the size of a grapefruit. On palpation it was well circumscribed, smooth, soft, and painless. It appeared extrinsic to the liver. There had been no jaundice, melena, clay-colored stools, obstipation, diarrhea, vomiting, hematuria, or edema. Intravenous pyelograms showed normal kidney and caliceal outlines, but irregular clusters of calcium were visible in the region of the right kidney in anteroposterior views. X-rays of

the skull and chest were negative. Blood counts and urine studies were noncontributory. Surgical consultants agreed with our impression of a malignant renal, adrenal, or retroperitoneal embryonal tumor.

and there were signs of intra-abdominal fluid (Fig. 2). The acute symptoms subsided with conservative treatment, and, in April, 1,000 c.c. of very viscid, amber-colored, ascitic fluid with a specific gravity of 1.005 was ob-

Fig. 1.

Fig. 2.

Fig. 1.—X-ray, July 14, 1955, showing lower border of tumor and normal right pyelogram.
Fig. 2.—X-ray, Jan. 4, 1956, after rupture of tumor, showing massive intra-abdominal fluid.

Because of the incurable nature and advanced stage of the brain degeneration, it was decided that surgical exploration was unwarranted. During the next six months at home the mass continued to enlarge, finally reaching the left mid-clavicular line and the iliac crest (Fig. 1).

On Jan. 3, 1956, while the mother was holding the child, she felt the mass "break," and brought him to the office. On examination the definite mass was no longer palpable, but the abdomen was distended, diffusely tender,

tained by abdominal paracentesis. This fluid gave a negative test for bile, a strong test for albumin, and a normal test (11 units) for amylase. A centrifuged sample, which was studied carefully by our pathologist, contained mesothelial and polymorphonuclear cells, but no tumor cells.

Since our patient had failed to show the usual downhill clinical course of malignancy, we began to doubt the original diagnosis. Review of all x-rays placed new emphasis on a lateral film showing the calcifications clustered

rather more anteriorly than might have been expected for a mass originating in the kidney-adrenal area. A cholecystogram was attempted and showed no dye in the gall bladder after single and double doses of Telepaque.

Surgical exploration under ether anesthesia was performed on May 18, 1956, by Dr. R. J. Brown (following the region of the fundus was exposed where omentum had apparently replaced the fundus wall. The gall bladder (Fig. 4) was filled with what appeared to be a mucoid type of carcinoma. There were large glands along the cystic and common ducts. The common duct was dilated. No pathology was felt in the pancreas or liver.

Fig. 3.—X-ray, May 17, 1956, after preoperative paracentesis, showing calcification pattern.

an unsuccessful attempt at splenoportogram). Five hundred cubic centimeters of amber ascitic fluid had been removed from the abdomen the day before. (Fig. 3.) More fluid escaped upon opening of the peritoneal cavity. The spleen, kidneys, and pelvic structures were normal to palpation, and no pathology was found except in the right upper quadrant. Here the omentum was strongly adherent to the fundus of the gall bladder, which was enlarged to about five times normal size. On separation of the omentum, a large defect in the gall bladder in

Cholecystectomy was performed without difficulty and the postoperative course was uncomplicated. During the subsequent eighteen months no evidence of metastasis or recurrence has been noted.

Pathology.—Dr. C. E. Black, pathologist, reported that the gross structure (Fig. 4) of the mass was cystic, with a yellow necrotic content and a thin, calcified wall. The omental segment was friable and arranged in papillary processes.

The initial impression of adenocarcinoma of the gall bladder was changed

to hamartoma after review of microscopic sections (Fig. 5) at the University Hospital in Ann Arbor,[8] at the Memorial Center Children's Tumor Registry in New York,[9] and at the Children's Medical Center in Boston.[10]

Dr. Sidney Farber reported microscopic sections showing: ". . . marked proliferation of the mucosa, which is folded and reduplicated, and shows hyperplasia of the epithelium in many places. Within the connective tissue

Fig. 4.—Operative specimen showing gall bladder with disruption of wall.

Fig. 5.—Section of hamartoma showing proliferation and hyperplasia of mucosa.

cores of the papillary projections are seen smooth muscle elements, as well as eosinophilic homogenous material. The presence of macrophages in the subepithelial tissue suggests a chronic inflammatory process. Portions of wall of a mucocele are present in association with the hyperplastic mucosa." His diagnosis was, "Hamartoplasia of gall bladder, benign, with adenomatous hyperplasia."

CONCLUSION

A case of hamartoma of the gall bladder occurring in a child is presented. The intra-abdominal occurrence of hamartoma is rare and no previous report of gall-bladder hamartoma has been found. The literature did not support a correlation between the hamartoma and the patient's coincidental brain degeneration. This tumor developed a huge mucocele, which occupied nearly two-thirds of the abdominal cavity before it ruptured. Observation for one year following successful cholecystectomy has revealed no evidence of recurrence or metastasis.

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ACUTE APPENDICITIS IN EARLY CHILDHOOD

FRANCESCO MINERVINI, M.D., AND THOMAS V. SANTULLI, M.D.
NEW YORK, N. Y.

THE diagnosis and treatment of acute appendicitis in the very young patient present a difficult problem and place a heavy responsibility not only upon the surgeon, but also, and perhaps to an even greater extent, on the general practitioner and pediatrician. It is only when this disease is constantly kept in mind by the physician called to the bedside of the very sick infant and young child that the diagnosis can be made early and treatment instituted promptly so that the morbidity may be decreased and the mortality kept at the lowest possible level.

Snyder and Chaffin[1] stated that up to 1952 they had found 447 reports on acute appendicitis in childhood in the medical literature. This reflects the gravity of the disease and the preoccupation of the pediatric surgeon lest the standards and signs that apply to the adult patient be inadvisedly applied to the young one. The history and physical findings which are usually so typical in the adult are frequently vague, unreliable, and misleading in the young child. Also, experience has shown that acute appendicitis in the younger age group can progress with appalling rapidity to perforation.

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Because of the continuing diagnostic and therapeutic difficulties that are presented by these young patients, we have reviewed our cases from 1947 through 1956. This report is based on a study of all patients under 4 years of age with acute appendicitis who were operated upon at the Babies Hospital in New York City during this ten-year period. During the same period acute appendicitis was an unexpected finding in the post-mortem examination of 5 premature infants. These cases were not included in the study.

Our series includes 83 children: 45 females and 38 males. Table I shows the distribution according to age and points out the rarity of the disease in the infant group.

TABLE I. DISTRIBUTION OF CASES ACCORDING TO AGE

AGE IN YEARS	NUMBER OF CASES	PER CENT
0 to 1	1	1.2
1 to 2	9	10.8
2 to 3	26	31.4
3 to 4	47	56.6

We found, in agreement with many others,[2-9] that the most frequent presenting symptom on admission was abdominal pain; this varied from very mild to severe, and was sometimes discovered by the mother of the patient, after other symptoms had appeared, as the only explanation for a fixed

position of the legs in flexion or for the continuous crying of the child. We have recorded in Table II the predominant symptoms elicited by the history.

TABLE II. FREQUENCY OF PREDOMINANT SYMPTOMS

SYMPTOMS	NUMBER OF CASES	PER CENT
Abdominal pain	77	93
Abdominal pain and vomiting	64	77
Vomiting, no pain	4	5
No pain or vomiting	2	2

Interpretation of the physical findings on admission to the hospital presented a difficult task in this study. Examination of the abdomen was frequently unsatisfactory because of the lack of cooperation of the patient or the difficulty of interpretation of the physical findings. In some cases sedation was needed for the examination. In most instances the examiner made some record of the presence or absence of local abdominal tenderness and rigidity or of their subsequent development. The localization of signs to the right lower quadrant was the most frequent finding in arriving at a decision to operate. In many instances, the general picture of acute illness and a history that was compatible with appendicitis coupled with a high index of suspicion following an unsatisfactory abdominal examination led the surgeon to operate. Tenderness or the palpation of a mass on rectal examination was of particular value in this age group and in some cases it was the only significant abnormal physical finding which led to the diagnosis. The fever range was from 99° to 105° F., depending on the pathological findings and the state of hydration of the child. Leukocytosis was present in the majority of cases; 85 per cent had a white blood cell count of over 10,000; in 58 per cent the count was over 15,000. The polymorphonuclear cells were usually elevated, as expected. However, in several cases of advanced appendicitis, the white blood count was normal. In general, only minor emphasis was given to the blood count in arriving at a diagnosis in this series.

We have continued to use the pathological classification of Schullinger[10-12] in studying our cases. His more recent statistics on the distribution of the pathological types covering patients of all ages treated at the Columbia-Presbyterian Medical Center appear in Table III and are compared to the age group under consideration.[13] It is of interest to note that in a previous report from the Babies Hospital by Taylor and Hodges[14] in 1941 of

TABLE III. PATHOLOGICAL DISTRIBUTION OF CASES

GROUP	PATHOLOGICAL DIAGNOSIS	NO. OF CASES	PRESENT SERIES (UNDER 4 YEARS) (PER CENT)	SCHULLINGER[13] SERIES (ALL AGES) (PER CENT)
I	Simple acute appendicitis	9	11	68.7
II	Acute appendicitis with localized peritonitis	15	18	17.0
III	Acute appendicitis with appendiceal abscess	25	30	9.5
IV	Perforated acute appendicitis with acute diffuse peritonitis	34	41	4.6
V	Acute appendicitis with progressive fibrino-purulent peritonitis	0	0	0.2

children up to 13 years of age, the same percentage of perforated and nonperforated appendicitis cases was recorded as that given by Schullinger. The important difference is found in the younger age group being presented. This has been emphasized in a recent paper by Fields and associates,[15] who reported perforation in 31 of 38 children 3 years of age or younger.

The interval between the appearance of symptoms and the time of operation was found to play an important part in the morbidity in terms of hospital stay (Fig. 1). The delay was due to the late appearance of the patient at the hospital or to indecision of

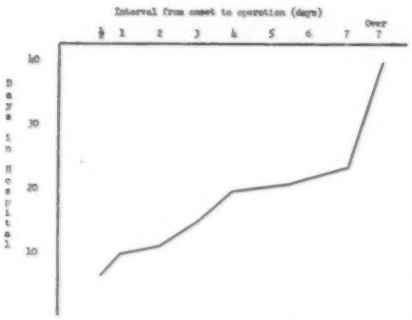

Fig. 1.—Days of hospitalization, as related to the delay between the onset of symptoms and the time of surgery.

the surgeon to operate after the patient had been admitted. Some of the delay was attributed to preparation of the patient for operation (hydration, nasogastric aspiration, etc.). Whatever the cause for delay, it was evident that the morbidity was increased in nearly direct proportion to the interval.

TECHNICAL CONSIDERATIONS

The McBurney incision was used in 74 of the cases; in 11 of these a Weir extension was necessary. A transverse incision in the right lower quadrant was used in five cases, and a right rectus incision in four. The appendiceal stump was inverted in 66 of the 83 cases. In the others, the stump was doubly ligated and not inverted because of edema of the cecum or difficult exposure.

Drainage was employed in 44 of the 83 cases for the indications previously outlined by Schullinger.[12] This is a relatively high percentage of cases in which drainage was used and may attest to the return to sound surgical principles rather than to the inordinate reliance on antibacterial agents.

MORTALITY AND COMPLICATIONS

In this series of 83 cases there were 1 death and 15 complications.

The fatality occurred in a 3-year-old Puerto Rican male (U. H. 980115) who was admitted in December, 1949, having a 7-day history of abdominal pain. He was acutely ill, with signs of acute appendicitis and roentgen evidence of lobar pneumonia. Operation was done under ethyl chloride and ether anesthesia 30 hours after admission. Appendectomy, without inversion of the stump, was performed for acute appendicitis and appendiceal abscess. During the procedure there was sudden cardiac arrest. Thoracotomy was done, and cardiac massage was started 4 minutes after the arrest, with restitution of the heartbeat. Postoperatively he showed evidence of severe cerebral damage, and he died 4 months later. Diffuse cerebral atrophy was found at post-mortem examination. The operative field and the pneumonia were well healed.

The death was attributed to an anesthetic complication. One may well

speculate on the outcome if the diagnosis of appendiceal abscess had been made preoperatively and operation withheld in the presence of co-existing lobar pneumonia or on the contributing roles played by the pneumonia, the preoperative delay (30 hours), and the tardy institution of cardiac massage.

The *complications* were: 8 cases of wound infection, 3 of paralytic ileus, 2 of pelvic abscess, 1 of acute gastric dilatation and 1 of thrombophlebitis. All but one of the complications occurred in cases of perforation or appendiceal abscess.

APPENDICEAL ABSCESS

As also noted by other observers, the percentage of patients who had both perforation and local abscess at the time of admission to the hospital is relatively high in this age group. In this series it was found in 25 of the 83 cases (30 per cent). The abscess was not suspected preoperatively in 11 of these cases, the diagnosis being established at operation. The small group of 14 cases in which the diagnosis of appendiceal abscess was made preoperatively was of particular interest to us since it may indicate a more recent trend in management. In 11 of these, operation was the treatment of choice (appendicectomy with drainage in 8, incision and drainage with subsequent appendicectomy in 3). In the other 3 cases conservative or nonoperative treatment was followed. These patients had "interval" appendicectomy 8 to 12 weeks later.

In the previous report from Babies Hospital in 1941 by Taylor and Hodges[14] the nonoperative treatment of appendiceal abscess was more frequently chosen and advocated.

This series is too small and the circumstances of the individual cases too variable to compare the operative and the nonoperative methods of treatment. However, it is our impression that there has been a trend toward "early operation" in these cases since the advent of the antibacterial drugs. It must be pointed out that the only death in this series was in a patient who was operated upon with an appendiceal abscess although the diagnosis was not made preoperatively.

SUMMARY AND CONCLUSIONS

1. Acute appendicitis in early childhood is a treacherous disease because the diagnosis is difficult to establish early in the illness. The frequency of perforation is inordinately high.

2. Local abdominal tenderness and rigidity or their subsequent development, and rectal tenderness or mass are the most important diagnostic signs.

3. A physical examination in this age group is too often unsatisfactory. Abdominal signs in an acutely ill, uncooperative young child may be impossible to evaluate.

4. A high index of suspicion of acute appendicitis with a history that is compatible with the disease must serve as the basis of diagnosis and the decision to operate in some cases in this age group.

5. There has been a recent trend to early surgery in cases of appendiceal abscess, in preference to conservative, nonoperative management.

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Clinical Pathological Conference

THE CHILDREN'S MEDICAL CENTER
BOSTON, MASS.

SIDNEY FARBER, EDITOR
JOHN M. CRAIG, ASSISTANT EDITOR

THIS 2-year-old white girl was admitted to The Children's Medical Center for the investigation of spasticity, convulsions, and mental retardation.

The child was the product of a normal full-term pregnancy and delivery. The mother was Rh negative and the father and baby Rh positive, but no rise in the mother's antibody titer was noted during pregnancy, and the baby's Coombs test was negative. The hemoglobin on the day of birth was "107 per cent."

The mother noted that the baby was jaundiced on the second and third days of life. The baby then did well, holding up her head at 3 weeks, and sitting alone at 4 months. The social responses were normal but the child was regarded as slightly lethargic, in retrospect.

At 6 months of age the legs were first noted to be stiff. At 8 months of age, creeping began, and, at 10 months, attempts to stand were made, but unsuccessfully. The child was toilet trained at 16 months and by 19 months of age was beginning to talk and was feeding herself.

When 20 months of age, the child became irritable, developed a fever of 102° F., refused to eat, and remained in bed. During this period, when poliomyelitis was prevalent in the neighborhood, her eyelids drooped, she stopped using her hands, could not get up, and had difficulty in swallowing solid foods. Because of suspected myasthenia gravis she was given Prostigmin, 7.5 mg. orally three times a day. There was good improvement after the first two doses, and then it was discontinued because of lack of further improvement. Somnolence now developed, and this was associated with generalized convulsive seizures and the development of incontinence. These continued daily for two to three weeks, then decreased to one every second or third day. No seizures had occurred in the month before admission to the hospital, though no anticonvulsants had been given. One month prior to entry she suffered a mild head injury. In the three-week period before admission, she had become more responsive, though her arms were noted to shake on attempts to perform voluntary acts.

Family History.—There is one healthy sibling 8 months of age. There is no known history of heredofamilial central nervous system disease.

The admission physical examination revealed normal vital signs. The head was 17.5 inches in circumference; the crown-heel length was 33 inches. The infant was well developed and well nourished, but nearly completely unresponsive except for a continuous twitching of the hands. There was a spastic quadriplegia with hyperactivity of all the tendon reflexes, a sustained clonus in all extremities, and a bilateral Babinski sign. Strong tonic neck patterns were elicited on both sides. The cranial nerves and the sensory examination were said to be normal. The remainder of the physical examination revealed no abnormalities.

The laboratory examination of the urine revealed no phenylpyruvic acid or other abnormalities. The blood examination gave a hemoglobin value of 11.9 Gm. per cent, an erythrocyte count of 4.96 million per cubic millimeter, a leukocyte count of 11.3 thousand per cubic millimeter, and a normal leukocyte differential on smear. The tuberculin reaction was negative. The serum nonprotein nitrogen and electrolytes were normal. Examination of the cerebrospinal fluid yielded no cells, a protein of 131 mg. per cent. No pressure was recorded. The electroencephalogram was a natural drowsing tracing with 4 to 6 per second waves as the predominant background rate, with 2½ to 3 per second high-voltage slow waves seen from the posterior leads when the patient became drowsier. There was a high-grade asymmetry in the precentral and occipital leads, the left side having a higher voltage than the right. The pneumoencephalogram was normal.

While in the hospital the child was quite irresponsive. There was some vomiting following the pneumoencephalogram; this symptom soon subsided. A repeat lumbar puncture four days after the air encephalogram revealed a reduced pressure, with 75 leukocytes, of which 10 per cent were polymorphonuclear cells and 90 per cent mononuclear cells. There were also 80 erythrocytes and a total protein of 96 mg. per cent. Gavage feeding was required for a few days after the air encephalogram. The patient was placed on cortisone (250 mg. per day) for a period of six days, and then was discharged on a maintenance dose of 150 mg. per day.

The child was followed in the Outpatient Department and displayed a progressively downhill course, with no relief of her decerebrate state. She became blind. Cortisone administration was stopped. The patient was eventually admitted to a state institution, and died there one year after discharge from the hospital, at the age of 3 years.

DISCUSSION

DR. CHARLES A. KANE.*—There are several questions which I think should be considered as one reads the protocol.

How deep was the jaundice? Was it increasing, and how long did it last? My suspicion is that it was probably physiologic rather than the deepening jaundice that one associates with kernicterus or erythroblastosis, in view of the negative Coombs test and the normal hemoglobin values.

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Except for "stiffness" of the legs with delayed locomotor development, the child then did fairly well. During the period of acute illness at 20 months of age came the first clue to some focal disturbance of neuromuscular or neurologic function. The child stopped using her hands, her eyelids drooped, she had difficulty in swallowing solid foods, and she was unable to sit. In a somnolent child who is having a fever, these symptoms would be difficult to evaluate at best. One is told that her physician suspected myasthenia gravis. I think that was a very apt observation—yet he was apparently not satisfied that it was the answer to the problem and promptly stopped Prostigmin in face of a transient improvement. I understand—although I have no personal experience with it—that occasionally pediatricians use Prostigmin to relax children with spastic conditions. Whether or not this had any bearing on her improvement at that time, I would not know.

In the short period of improvement, three weeks before entry, the child began smiling again but her arms were noted to shake when she tried to perform voluntary acts. Perhaps this was a nonspecific fatigue phenomenon in a sick child, or perhaps it did indeed represent an intention tremor which would be of great significance in view of its possible localization to the cerebellar pathway system.

On physical examination, the head diameter was about an inch smaller than it should be for a child of this age, so that a mild degree of microcephaly may be said to have been present. There was no hepatosplenomegaly noted or mentioned. This would help us to exclude such possibilities as Niemann-Pick disease and Gaucher's disease. I would assume that the fundi were within normal limits. In a child of this age, the textbook cherry-red spot of cerebromacular degeneration may not be visible, but one should see perimacular edema or some disturbance in the retinal appearance immediately adjacent to the fovea. Recently, at one of the pathological meetings it was mentioned (but I cannot find any further confirmation of this, or even an allusion to the original report) that in certain cases of cerebral macular degeneration one may find a high beta-lipoprotein in the blood. This is the only clue that Tay-Sachs disease may be associated with some systemic nonnervous abnormality.

I had an opportunity, just a few minutes ago, to see a small sample of the electroencephalographic tracing. It is exactly as described in the protocol, and again I would like to stress its negative aspects. I saw nothing there which resembles the triphasic wave forms which Cobb and others[1] have described in twelve cases of cerebral lipoidosis in children. These triphasic wave potentials are non-focal. They are dysynchronous, and they do not have any particular predilection for occipital or frontal areas. They are never seen in adult patients with cerebral lipoidosis. These investigators feel that if a child with diffuse encephalography shows triphasic wave potentials, one can eliminate Schilder's disease and seriously consider the possible presence of a diffuse neuronal disorder, such as a cerebral lipoidosis. Again this is negative information, and as my

colleague, Dr. Joseph Foley, is prone to point out—the man who makes a positive observation is far ahead of the man who makes a negative observation.

The pneumoencephalogram was negative, which helps me to exclude subdural hematoma and a large infiltrative tumor or abscess near the ventricles.

A brain biopsy would have been of some interest in this child. Recently, at the Boston City Hospital, we had the neurosurgeons do a brain biopsy in a similar case where prognosis was of great importance since the child had two younger siblings. In such a biopsy one can usually exclude or establish diffuse neuronal disorders such as lipoidosis. In our particular case we were disappointed to have a nonspecific report. It has also been pointed out that if these children with diffuse neuronal lipoid disorders have to undergo an abdominal operative procedure, or if a biopsy of an autonomic ganglion such as the stellate is performed, the pathologist may find the typical swollen neuronal cells.

The only thing that we should perhaps discuss further is what interpretation we should give to the second spinal puncture done four days after the pneumoencephalogram. The introduction of air in the spinal subarachnoid space is a moderately irritating procedure, even in children, and my interpretation of the second spinal fluid finding is that they would not be inconsistent with a sterile meningeal inflammatory reaction due to the introduction of air. I do not believe they represent a primary or chronic meningeal inflammatory disease.

Now, I believe that there is one key word in this protocol. This is "twitching," and I would like to find out as much as I can about this. Was it actually myoclonic with rapid jerk-like movements of the extremities, or was it a fine rapid tremor?

DR. PETER AULD.—The record states: "There is a continued twitching of the hands when the child is placed on her abdomen, and there are gross clonic movements."

DR. KANE.—Was this myoclonus or myoclonic epilepsy? Myoclonic epilepsy refers to a familial syndrome described originally by Unverricht[2] and more recently by Lundborg[3] with progressive dementia, spasticity, quadriplegia in flexion, and a peculiar type of epilepsy which is remarkably sensitive to audio, visual, and proprioceptive stimuli. If you clap your hands beside the ear of one of these children, he will have a quick, lightninglike flexion contraction of one or many of the muscles of his body. This syndrome has been described since in a variety of forms. Recently, Dr. Denny-Brown and Dr. Wesley Watson[4] at The Boston City Hospital have been investigating its pathology and electrophysiology. Physiologic myoclonus may occur in normal people on waking with a start, but when it progresses to various parts of the body and is associated with dementia, incontinence, and speech disturbances, the syndrome of Unverricht or Lundborg or, at least, some sort of diffuse neuronal disorder must be considered.

Did the twitching in this child actually represent myoclonus or not? If it did, I can make one of four quite specific diagnoses. If it did not, I

have to arrive at some other conclusion. What are the four possibilities, on the basis of myoclonus as a symptom of a diffuse neuronal disease?

Any child who is jaundiced at birth certainly has to be considered as a possible candidate for the late complications of kernicterus. I would use the following evidence: (1) The child was not deaf. (Dr. Byers and Dr. Crothers at this hospital have recently reported that in a large series of cases of kernicterus there is a remarkable degree of perceptive deafness. Only one out of twenty-three children in their group failed to have a perceptive deafness.) If this child did not hear well, the odds are against this illness being a late complication of kernicterus. (2) Convulsions are rare in kernicterus. (3) This was a first-born child. (4) The laboratory data are not suggestive of kernicterus—to eliminate that possibility. Yet, I would not be shocked if some damage to the dentate, olivary, or hypothalamic nuclei were found at post-mortem. Therefore, we would have to list kernicterus as a possibility, although I am eliminating it for the moment. Now, as far as the second possibility is concerned, very briefly, the neuronal disorders that we must consider here are those which are lumped under the term "cerebromacular degeneration" and by definition this does not mean just Tay-Sachs disease, but what Dr. J. Godwin Greenfield, the dean of neuropathologists in England and on the Continent prefers to call "Batten's disease," because Batten actually described these before Spielmeyer, Vogt, Bielschowsky, or Kufs. These appear to present a spectrum with very severe cases early in life and mild cases later in life. There is a possibility, then, that this might be a form of diffuse cerebral lipoidosis, though we can, I believe, eliminate the systemic lipoid disturbances, such as Gaucher's, Niemann-Pick's, or Hurler's.

The third possibility is so-called "myoclonus epilepsy with inclusion bodies." A fourth possibility is Dawson's encephalitis, or so-called "subacute inclusion body encephalitis." Such cases have been described by Greenfield.[5] These patients with so-called (subacute) inclusion body encephalitis live from a few weeks up to 2 years, and as far as I can tell from reading the protocols, may manifest exactly the same clinical symptomatology as the patient under discussion. Both are rare and almost never correctly diagnosed in life.

If this is *not* true "myoclonic epilepsy," this brings us to the diffuse scleroses, such as Schilder's disease, or the Pelizaeus-Merzbacher syndrome, a more chronic form of the same process. Greenfield,[6] again, has introduced a confusing element into the situation and has described another form which he calls "late infantile metachromatic leuko-encephalopathy," which resembles in some ways the diffuse scleroses, and yet appears to be atypical.

I have been trying to determine what there is about the case that led to the introduction of cortisone therapy. Cortisone has been used by neurologists for a variety of different reasons—among them the treatment of neurological complications of certain collagen diseases. It has a limited use in tuberculous meningitis,

with which I am sure you are familiar, and one or two enthusiastic groups of workers have attempted to use it in myasthenia gravis. I am sure it has no place in the latter situation. The dose used here seems to me to be rather large for a child weighing 40 pounds, in terms of the dose one would use in an adult.

If I were to make a guess—and I think there is no point in discussing a protocol unless you do make a guess—mine will be predicated on the belief that these were true myoclonic twitchings, and, therefore, my conclusion is that this is probably not diffuse gray matter disease, such as Alpers disease, nor one of the diffuse scleroses, but one of the types of diffuse neuronal disorders which we mentioned—a cerebral lipoidosis, myoclonic epilepsy, or one of the inclusion body encephalitides. My final statement is this—if this is true, then the spinal fluid is distinctly unusual. The spinal fluid would fit in better with Schilder's or one of the demyelinating types of diffuse sclerosis than it would with one of the cerebral lipoidoses. So, I am on the horns of the traditional dilemma. Either I believe the spinal fluid and diagnose Schilder's disease or something akin to it, or else I do not believe the spinal fluid, interpret the twitchings as myoclonus epilepsy, and diagnose diffuse neuronal disorder.

DR. FARBER.—Do you have any ground for disbelieving the spinal fluid?

DR. KANE.—No, I do not. I accept that. It just poses a problem in the sense that in the diffuse neuronal disorders, one would *not* expect the spinal fluid to show an elevated protein, whereas in Schilder's disease it is possible. I am quite sure about one thing. I doubt that this child had myasthenia gravis.

DR. FARBER.—I think the dilemma is one which has perplexed us many times. Should we accept a laboratory finding which appears to be clean-cut, but which is not entirely consistent with the clinical picture, or shall we stress the clinical findings and disregard the laboratory evidence which is not consistent with the clinical picture? Perhaps this discussion will bring out the feelings of the house staff. Dr. Berenberg, may we begin with you? Is this myasthenia gravis?

DR. WILLIAM BERENBERG.—I would agree with Dr. Kane that this is not myasthenia gravis. Is this not perhaps an individual who has had spastic quadriplegia of cerebral palsy, who then went on to a convulsive state, as so many of them do? I agree with your statement about the rarity of convulsions in those who have had kernicterus, but certainly such terminal states are common enough in those who have gone on to a diffuse degeneration as a result of repeated seizures. I was more impressed with the spinal fluid values than you were, Dr. Kane, particularly because two readings were significantly elevated. I would be inclined to put the case in a degenerative group for that reason alone. I would like to ask Dr. Kane if the pneumoencephalogram helps at all in differentiating these degenerative states?

DR. KANE.—Not particularly, Dr. Berenberg, except in a sense that if the process resulted in hydrocephalus, we would expect an abnormal pneumoencephalogram. I think it is quite

conceivable that a child might have any one of the syndromes that we mentioned with a perfectly normal pneumoencephalogram.

DR. MARTIN H. WITTENBORG.—I am not prepared to say that the pneumoencephalogram of this patient is quite normal. The cranial vault is borderline in size and at the lower limits of normal size. By itself, I think that would mean very little. The lateral ventricles are top normal in size, again a finding, in itself, of doubtful significance. With a head which is smaller than normal and with the ventricles a little larger than normal, you can say that some diffuse diminution in the total mass may be present, provided there is no obstruction of any sort.

DR. KANE.—This would, perhaps, be against Schilder's disease.

DR. WITTENBORG.—I think so. I think that we see this sort of thing in older age groups in many conditions. I have no idea whether this represents hypoplasia or diffuse decrease in brain substance.

DR. CRAIG.—Would not your encephalogram be of more diagnostic value later in the course of the degenerative process and show some atrophy in these children?

DR. KANE.—The clinician may get a clue as to the presence of Schilder's disease in that, of all the degenerative encephalopathies, it is the one which may be associated with papilledema, an increased intracranial pressure, and an elevated spinal fluid protein. During the preliminary phases of degeneration, the myelin becomes swollen and this produces a papilledema, or at least a swelling of the optic disk.

DR. FARBER.—The swelling may be so great in Schilder's that on one occasion, twenty-five years ago, a clinical diagnosis of bilateral glioma of the optic nerves was made. At post-mortem, indeed, these optic nerves were huge. The late Dr. Myrtelle M. Canavan,[7] who studied that brain with the well preserved optic nerve swelling, found a typical example of Schilder's microscopically.

DR. RICHMOND S. PAINE.—We who followed this child believed that she had one of the degenerative diseases of the white matter of the Schilder's group. We felt that a differential diagnosis between the different members of the group could not be made during life. The protocol does not fully indicate the progressive nature of the child's illness.

There have been various word-of-mouth reports that Schilder's disease and others of that group are supposed to be benefited by cortisone. There are two such cases which Dr. Sydney Gellis is following at the Beth Israel, one of which had, on pneumoencephalography, what appeared to be a mass projecting into one lateral ventricle. At operation, this mass was found not to be a tumor, but rather a mass of degenerating myelin of the Schilder type and it was felt, therefore, that the diagnosis was confirmed. That child improved very dramatically on cortisone. I have seen her several times since, on and off cortisone. Each time she was better on the cortisone and worse without it. The other patient has, I strongly suspect, multiple sclerosis rather than Schilder's disease and is naturally having her ups and downs. Because of the possibility that cortisone might be of benefit, it

was tried here, with no great success as the ultimate outcome obviously showed.

DR. KANE.—It would have been of great interest in this case to do a quantitative test for gamma globulin by the zinc sulfate precipitation test developed by Dr. Joseph Foley at the Boston City Hospital, after eliminating liver disease and neurosyphilis. This test is now somewhere between 85 and 90 per cent accurate in making a very strongly suggestive diagnosis of a demyelinating disease. The levels of gamma globulin that he would consider significant are somewhere on the order of 15 per cent of the total protein, or more. If the percentage of gamma globulin in the spinal fluid exceeds 15 per cent of the total in a patient with various neurologic symptoms, the presumption is that they may well be due to multiple sclerosis. I do not know whether any such tests have been tried in patients with Schilder's disease.

DR. CRAIG.—In this child, the immediate cause of death was a very extensive hemorrhagic bronchopneumonia, in which numerous coccal bacterial forms were easily demonstrable. The brain had quite classical changes of Schilder's disease. It was 300 Gm. below the standard for the child's age. The ventricles were mildly dilated, and this appeared to be due to loss of brain substance, since no obstruction was demonstrable. There was a marked decrease, grossly, in the differentiation of the gray and white matter (Fig. 1) and many small cystic spaces were present in the depths of the white matter. Large brain sections, prepared by

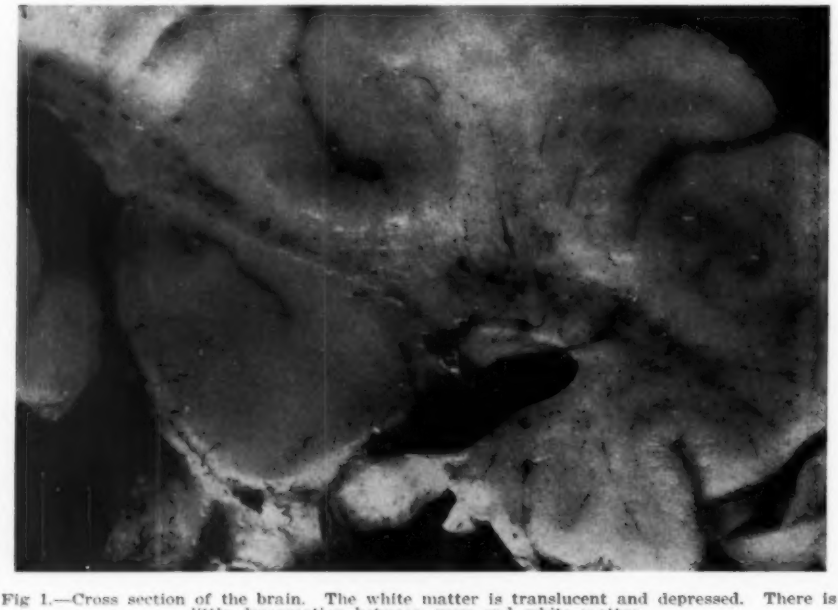

Fig. 1.—Cross section of the brain. The white matter is translucent and depressed. There is little demarcation between gray and white matter.

Dr. Paul I. Yakovlev of the Harvard Medical School, revealed a very marked loss of myelin in many areas of the brain, especially in the centrum ovale (Fig. 2). As is usual in Schilder's disease (encephalitis periaxialis diffusa) the arcuate fibers running from one gyrus to an adjacent one were preserved. A Sudan black fat stain (Fig. 3) of the white matter shows few myelin sheath structures and many fat-filled macrophages to be present, both diffusely and in a perivascular distribution. Though the cerebral neuronal stripe was well preserved, there was considerable loss

Fig. 2.

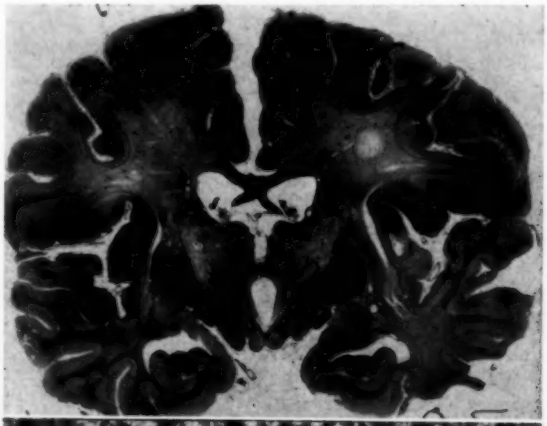

Fig. 3.

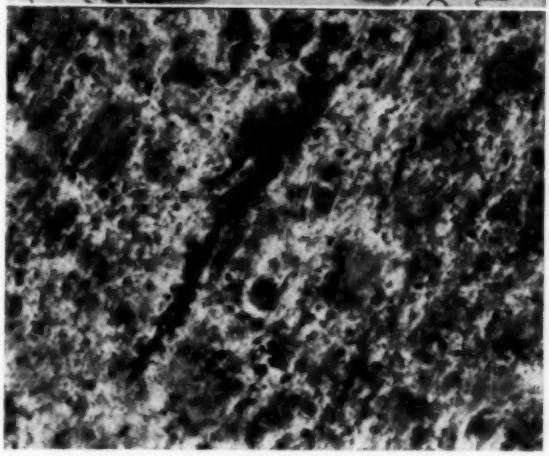

Fig. 2.—Photograph of brain section. There is marked demyelination of the white matter, especially the centrum ovale and internal capsule. The arcuate fibers are partially spared. Loyez stain. (Reduced from normal size by $^{9}/_{11}$.)

Fig. 3.—Photomicrograph of brain. An area from the subcortical white matter with marked demyelinization and irregular masses of lipid having some perivascular accumulations. Frozen section; Sudan black stain. (×330.)

of neuronal elements from the dentate nucleus in the cerebellum, the inferior olivary nuclei in the medulla, and in the spinal cord. These latter changes are considered to be secondary, perhaps to the anoxic spells associated with her convulsions. The other cerebral degenerative states of childhood such as the concentric form of Barlow, that of Pelizaeus and Merzbacher, the metachromatic leukoencephalopathies, and Krabbe's disease can, I believe, all be eliminated on an anatomic basis of distribution and the type of tissue reaction.

Many different etiologic considerations have been evoked in the attempt to explain Schilder's encephalitis, including allergic, infectious, viral, hereditary, and metabolic mechanisms. None have been incriminated without doubt.

DR. KANE.—The predominant opinion among neurologists and neuropathologists is that these demyelinating diseases represent a spectrum of the hypersensitive reaction in the nervous system, from slowly progressing lesions (as in some cases of multiple sclerosis) to very rapidly progressing processes (as in the so-called hemorrhagic leukoencephalopathies). It is of interest that the gamma globulin of the cerebrospinal fluid may be elevated in some of these states, which is, of course, of interest in view of the relation of gamma globulin to the immune states.

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Medical Progress

THE TONSIL-ADENOIDECTOMY ENIGMA

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"From inability to let well alone; from too much zeal for the new and contempt for what is old; from putting knowledge before wisdom, science before art, cleverness before common sense, from treating patients as cases, from making the cure of the disease more grievous than the endurance of the same, Good Lord, deliver us."

Sir Robert Hutchison
(Brit. M. J. 1: 671, 1953)

NO operation in childhood is performed as frequently as T and A. Contrary to the view of many discriminating physicians, the procedure is as popular now as it was 20 years ago, perhaps more so. Yet evidence of its beneficial effect is of the most tenuous sort. The operation retains its vogue in the face of well-documented evidence that, in the overwhelming majority of cases, it is useless.

T and A is generally regarded as a harmless procedure. It was so regarded 20 years ago. In the light of the clearly demonstrated relation between T and A and bulbar poliomyelitis, we now know that it was in no sense a procedure to be taken lightly. Over the years many children have died, many others have lingered in respirators, clinging desperately to an existence which offered at best permanent crippling, because of a T and A decided upon casually.

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Newspapers and health insurance publicity have helped to keep alive the popularity of the operation. In an article in the staid *Wall Street Journal* (Nov. 2, 1955) under the headline—"Boonton, N. J., Group Cuts 'Frills,'" we find the following: "At 9 o'clock this morning, 65-bed Riverside Hospital here will open its doors for the first time. Exactly one hour later seven year old Diane Pierce is scheduled to have her tonsils taken out."

The *New York Times* (Dec. 25, 1956), writing about the blessings of the new "medicare" program, says, "A heavy backlog of tonsil cases involving sons and daughters of servicemen is being whittled down by civilian physicians."

Blue Shield (April 2, 1952) boasts: "A few months ago five branches of the Giordano family received $300 worth of benefits within a few days as the need for surgery swept the children. Eleven of 33 grandchildren of Paul Giordano required tonsillectomies."

THE FREQUENCY OF T AND A

Data on the frequency with which tonsils are removed are difficult to obtain because there is no uniformity in the practice in different communities. The report of the Chief Medical Officer of the Ministry of Education for England and Wales for the years 1952 and 1953[1] points to the puzzling variations in the T and A rates in different areas. Some of these are shown in Table I. In Leeds, for example, the chances of a child having had a tonsillectomy in 1953 were 10 times greater than in nearby Sheffield.

TABLE I. THE PERCENTAGE OF SCHOOL CHILDREN OPERATED UPON FOR TONSILLECTOMY IN VARIOUS CITIES IN ENGLAND, 1953*

	SCHOOL POPULATION	PER CENT OF SCHOOL POPULATION OPERATED UPON
Leeds	70,988	4.2
Sheffield	76,811	0.42
East Ham	16,868	3.2
West Ham	28,279	0.46
Manchester	108,080	1.7
Liverpool	131,275	0.36

*Source: The Health of the School Child. Report of the Chief Medical Officer of the Ministry of Education for the Years 1952 and 1953. P. 21, 1954.

Even more striking are the 1954 figures supplied by the Registrar General.[2] A child in Rutlandshire is 19 times as likely to have a T and A as one in neighboring Cambridgeshire; and in sunny Bexhill the operative rate is 27 times as great as in northerly Birkenhead.

A similar situation exists in the United States. Schlesinger's[3] data show that the proportion of children, 3-9 years, who had T and A's was 3 times higher in Newburgh, N. Y., than in adjacent Kingston; and, in a survey of the practice of T and A among physicians specially interested in children, Wolman[4] found that a relative small proportion of physicians are doing a disproportionately large number of operations.

A further difficulty in estimating the frequency of T and A is that the socioeconomic grouping is an important consideration. In the study made by Downes[5] in Westchester County, N. Y., children of the professional and managerial class were much more likely to be operated on than those of the semiskilled and unskilled group.

In England, Glover[6] found that T and A was performed more than 3 times as often in children of the well-to-do as in those who attended public elementary school. At Eton, in 1938, 83 per cent of new boys had had their tonsils removed before entry at about 13 years of age. In general, the wealthier and more exclusive the school the higher the tonsillectomy rate.

A study of T and A in Australia has been reported by Dey.[7] He surveyed a group of approximately 700 children who had been recommended for T and A by experienced members of the visiting staff of the Sydenham Children's Hospital but who were not operated on because of a poliomyelitis epidemic. On re-examination 18 months or more later it was concluded that operation was unnecessary in 37 per cent. Dey also found that 49 per cent of a series of children attending free public schools in Sydney had had T and A's, while more than 70 per cent of children attending private schools had lost theirs.

In 1932-33, the American Child Health Association[8] presented data on the frequency of T and A in 1,000

children from the public schools in New York City. At that time 61 per cent of the children had had their tonsils removed by the time they were 11 years of age.

Seventeen years later, Siegel, Greenberg and Magee[9] surveyed the situation again and discovered that 53,007 T and A's had been performed in the hospitals of New York City during 1949. The average annual number of births during the 5-year period, 1940-1944, was 117,344. Using this figure as a measure of the child population, and assuming that 1949 was a representative year for T and A, then roughly 45 per cent of New York City children had had their tonsils removed in hospitals in the city. Surprisingly, however, a considerable number of New York children are operated on in the private offices of physicians and outside the city. Of 74 children with poliomyelitis, Siegel, Greenberg, and Magee found that 24—almost a third —had had tonsillectomies elsewhere than in New York City hospitals. It is hardly justifiable to generalize on the basis of this small sample but evidently a 45 per cent estimate of children operated in New York City is low. The frequency of T and A was probably not materially different in 1949 from what it had been in 1932-1933.

Downes,[5] working in 2 communities in Westchester County, N. Y., found that T and A has risen sharply during the past 5 decades. Of persons born before 1910, 19 per cent had been operated on by the time they reached their twentieth birthday. Among those born between 1910 and 1929, 48 per cent had lost their tonsils by the same age; and of those born after 1929 the figures had risen further, to over 55 per cent. In families where the head was of the professional or managerial class the percentage of T and A's in the youngest group (born after 1929) was 67.

Another interesting feature brought out by Downes' report is the earlier age at which T and A is now performed. For example, in males 40 years and over in 1949, only 4 per cent had lost their tonsils by the time they were 5 years old, compared with 18 per cent in the 20- to 39-year-old group and 42 per cent in the under-19-year-old group.

TABLE II. COMPARISON OF THE FREQUENCY OF TONSIL-ADENOIDECTOMY IN 1943 AND 1951, ROCHESTER, N. Y.*

AGE—YEARS	PER CENT OPERATED UPON	
	1943†	1951‡
14	51	61
15	51	59
16	58	57
17	50	55
14-17	52.5	57.5

*Source: Dr. Albert D. Kaiser.

†Based on 40,454 examinations in all schools.

‡Based on 821 minors examined for work permits.

The late Dr. Albert D. Kaiser (loc. cit.) supplied data on the frequency of T and A in Rochester, N. Y., in 1943 and 1951 (Table II). The number of operations increased from 52.5 per cent of teenagers in 1943 to 57.5 in 1951.

According to the Registrar General's report for 1954,[2] 226,211 T and A's were done in National Health Service Hospitals. This does not include patients operated on in private hospitals and nursing homes. Since the number of births in England and Wales is about 670,000 a year, this means that one third or more of British children are having T and A's.

The tonsillectomy fad is world-wide. Even in faraway India, Wagle[10] deplores the frequency of the operation.

The Metropolitan Life Insurance Company has recently published figures on the frequency of admissions to hospitals of the dependent children of the company personnel (Table III). T and A's accounted for nearly half of the operations in children under 20 years; the proportion under 10 years exceeded two thirds.

TABLE III. THE ANNUAL HOSPITAL ADMISSIONS PER 1,000 DEPENDENTS OF PERSONNEL, METROPOLITAN LIFE INSURANCE COMPANY, 1954-55*

AGE (YEARS)	ALL TYPES OF SURGERY		TONSILS AND ADENOIDS	
	MALES	FEMALES	MALES	FEMALES
0-19	46.2	38.8	21.9	20.7
0-4	38.7	25.0	17.4	13.6
5-9	69.3	62.5	47.5	43.7
10-14	33.3	28.7	7.4	11.3
15-19	36.1	35.6	4.1	4.6

*Source: Statistical Bulletin, Metropolitan Life Insurance Company, April, 1957.

According to data obtained from the Michigan Medical Service (M M S), this plan paid for about 44,000 T and A's in 1955 (12 operations per 1,000 members). If the frequency of operations was the same for persons not insured by the M M S, then about 88,000 T and A's were performed in Michigan in 1955. Since the annual number of births for the past 10 years has averaged about 160,000, this means that over half the children in Michigan are having tonsillectomies.

Le Riche and Stiver[11] report that the annual rate for T and A in 1955 was 19.8 per 1,000 members insured in the Physician's Services, Inc., Ontario. The frequency by age corresponds closely with the Metropolitan Life Insurance Company data.

WHY ARE TONSILS REMOVED?

An interesting approach to the T and A problem was that of Wolman[4] who surveyed, by questionnaire, 3,441 physicians with practices confined principally to the care of children. Among the questions asked was, "What do you consider indications for tonsillectomy and adenoidectomy?" The replies are summarized in Table IV.

Thirteen indications are given. Heading the list is "recurrent or chronic otitis media," which was included in every physician's reply. Other indications prominently mentioned are mouth breathing or snoring due to large size of tonsils or adenoids, recurrent or chronic tonsillitis, early hearing impairment, recurrent or chronic cervical adenitis, peritonsillar abscess, recurrent or chronic asthma induced by respiratory infections, "tendency" toward rheumatic fever, recurrent or chronic sinus infection, and recurrent or chronic lung infection.

Others[12, 13] have listed more "indications" such as suppurative sinusitis, general underdevelopment associated with frequent attacks of adenotonsillitis or excessive adenotonsillar hypertrophy, speech defects associated with excessive adenoid and tonsil hypertrophy, foul breath, diphtheria carrier state, snoring, high-arched palate, pigeon breast, pyelitis, retarded mental development due to anoxemia, nightmares, night sweats, cough, and enuresis.

In actual practice, the overwhelming majority of children are operated upon for one or more of three reasons: parental pressure for the operation, large tonsils or adenoids, and frequent upper respiratory infections.

TABLE IV. THE INDICATION FOR TONSILLECTOMY AND ADENOIDECTOMY*

INDICATIONS	SIMULTANEOUS TONSILLECTOMY AND ADENOIDECTOMY (PER CENT)	TONSILLECTOMY ALONE (PER CENT)	ADENOIDECTOMY ALONE (PER CENT)	TOTAL† (PER CENT)
Recurrent or chronic otitis media	77.2	0.9	21.9	100.0
Prominent mouth breathing or snoring due to large size of tonsils or adenoids	66.9	1.2	19.8	87.9
Recurrent or chronic tonsillitis	80.1	5.7	0.7	86.5
Early hearing impairment	58.4	0.9	26.9	86.2
Recurrent or chronic cervical adenitis	55.4	3.7	0.8	59.9
Previous quinsy (peritonsillar abscess)	47.5	9.1	0.7	57.3
Recurrent or chronic asthma induced by respiratory infections	35.5	0.3	1.7	37.5
"Tendency" toward rheumatic fever	32.8	1.2	0.4	34.4
Recurrent or chronic sinusitis	24.5	0.6	5.9	31.0
Recurrent or chronic lung infection	23.0	0.5	1.2	24.7
Scarred or cryptic tonsils	7.6	1.8	0.1	9.5
Large size alone	6.2	1.7	1.3	9.2
Routine	0.5	0.1	---	0.6
Others	2.7	0.4	1.0	4.1

No answer (0.6 per cent)

*Source: Wolman, I.,[4] with the kind permission of the author.

†This "Total" column portrays the relative importance ascribed by pediatricians to the indications listed.

Despite much propaganda against indiscriminate tonsillectomy in the past 20 years, parents continue to press strongly for the operation. There is still a widespread impression among the laity that it is, in some way, a desirable health measure and that it protects against colds. Health insurance plans have fostered the operation. Now that it is "free," the physician, in considering the need for T and A, is no longer deterred by concern about the cost to the patient and consequently judgments are made with less deliberation.

In this connection, an interesting observation was made by the American Child Health Study Group.[8] They found that 28 out of 29 of the children, taken to a free clinic with their school medical examination slips calling attention to their tonsils, were operated on whereas none of the 7 children who went to private physicians were operated upon.

Size of Tonsils and Adenoids.—The use by physicians of tonsillar size as an indication for operation was investigated by the American Child Health Association in 1932-1933.[8] The tonsil problem was part of a larger survey of the effectiveness of school health services. Whereas in the case of most defects—dental, visual, auditory—their study was directed toward finding better ways of correcting defects which were discovered, in the case of tonsils the inquiry took a different course, namely, toward explaining the large number of tonsillectomies.

A sampling of 1,000 children, 11 years of age, from the public schools of New York City disclosed that 61 per cent had already lost their tonsils. The remaining 39 per cent were examined by a group of school physicians who selected 45 per cent of these for T and A and rejected the rest. The rejected children were then re-examined by another group of physicians, who recommended for operation 46 per cent of those remaining after the first examination. When the rejected children were re-examined a

third time, a similar percentage—44—was selected for operation, so that after 3 examinations only 65 children out of 1,000 remained who had not been recommended for T and A. These subjects were not further examined because the supply of examining physicians had run out.

The study showed that there was no correlation whatsoever between the estimates of one physician and that of another regarding the advisability of operation. The authors therefore concluded that the chance of a child's being recommended for operation depended principally on the physician rather than on the child's health status.

The American Child Health Association study revealed that nurses were giving much more attention and time to the medical examiner's tonsil recommendation than to other health defects. In a sample of 382 11-year-old children with extreme dental defect, 53 per cent had had their tonsils removed and, in a group of 342 children with uncorrected visual defect, 46 per cent had had tonsillectomy. Here were 2 groups of children, with extreme handicaps for which nothing had been done, yet they had had tonsillectomy.

A study, not often enough discussed in the voluminous literature on T and A, is by Epstein[14] from the clinic of the late Dr. Joseph Brennemann. He followed 540 children, ranging in age from 2 to 13 years, before and at intervals for 2 years after operation.

He observed no relation between the size of the tonsils and the results of the operation. Nor could he detect any connection between the size of the crypts and the amount of caseous matter which they contained, on the one hand, and the results of the operation, on the other. Buried tonsils were no different from others in the type or severity of preoperative symptoms, in the rapidity of recovery from the operation, or in the final results.

In 152 of the children, histologic sections of the tonsils were studied. Practically all showed some degree of infection or connective tissue scars or both. There was no correlation between the histologic appearance of the tonsils, the type or severity of the preoperative symptoms, or the result of the operation. "Whether the tonsils were buried, cryptic, smooth, large or small, bore no relation to the preoperative symptoms or to the degree of success of the operation." For example, some healthy-looking children with no complaint except mouth breathing had tonsils which were riddled with abscesses and sealed off with scar tissue. Conversely, other children with an almost constant complaint of sore throat accompanied by severe systemic reactions, had almost normal tonsils.

No correlation was found between the size of the adenoids, determined by digital examination under anesthesia, and the results of operation. Although all the children with almost completely obstructed nasopharynges suffered from some degree of mouth breathing, a surprising finding was the sizable number of children with only slight narrowing of the nasopharynx who were also mouth breathers. Of 37 children with practically no obstruction in the retropharyngeal space, 20 showed some degree of mouth breathing and 11 were almost constant mouth breathers.

Even more surprising was the fact that these children were frequently cured of mouth breathing by the operation. Six of the 11 children who had little nasopharyngeal narrowing on digital examination and whose adenoids on removal were small but who were constant mouth breathers were completely cured and 2 others were improved by operation.

Epstein concludes that the appearance of the tonsils should never influence one's judgment as to the wisdom of removing them to improve the child's health. "The physician does not know an infected tonsil when he sees one."

Respiratory Infections.—Probably the most common reason why tonsils are removed, regardless of the indications listed by physicians, is to prevent or reduce the incidence of respiratory infections. Yet all available evidence shows that the operation neither prevents nor significantly reduces the incidence of these troublesome ailments. Gafafer,[15] in 1932, observed no significant difference with respect to the frequency, severity, or type of attack of disease of the upper respiratory tract in tonsillectomized and nonoperated persons.

A pioneer study of the effect of T and A on the health of children was reported by Kaiser in 1931[16] and again in 1940.[17] He compared the health of 2 groups of children. One group had had the tonsils removed, the other had been recommended for T and A but, for one reason or another, had not been operated on.

Kaiser, in a 10-year follow-up study, observed a reduction in the frequency of tonsillitis and sore throat after operation which persisted during the entire period of study. For a period of 3 years after operation, the surgically treated children enjoyed greater freedom from colds but during the next 7 years the children who had had operations actually had more colds than the unoperated group. Kaiser concludes that, on the whole, the children who were operated on showed only a slight advantage over the unoperated and that the advantage could not be considered statistically significant.

The incidence of pneumonia and bronchitis was greater in the tonsillectomized than in the nonoperated group.

A major source of error in Kaiser's work was that he had to rely on evidence given by the parents. This source of error has been eliminated in the more recent studies.

A careful study of the effect of T and A on the health of 909 girls from well-to-do families attending a large boarding school in England was reported by Paton,[18] in 1943. Fifty-seven per cent of these girls had had their tonsils removed. In 57 (6.3 per cent) the tonsils alone had been removed and in 24 others (2.6 per cent) only the adenoids.

Pharyngitis was equally common in the operated and nonoperated group. Common colds were more frequent among the tonsillectomized. Pneumonia and pleurisy were rare in both groups but were more frequent in the operated group.

Though tonsillitis was less frequent in the operated group, acute bronchitis was more frequent and caused more days lost than were gained by freedom from tonsillitis. Removal of tonsils alone protected against tonsillitis but

seemed to be responsible for an increase in respiratory infections. Adenoidectomy seemed to reduce the liability to the usual respiratory infections but it increased the susceptibility to acute otitis media and failed to prevent recurrences.

As part of a study of respiratory illness in two communities in Westchester County, N. Y., Mertz[19] visited families every 28 days during 3 school years, September to June, 1946-1949, and inquired about acute respiratory illness during the preceding 4 weeks. Acute respiratory disease included head colds, colds without sore throat, tonsillitis, septic sore throat, colds with chest involvement such as tracheitis and bronchitis, and influenza or grippe. Patients were divided by occupational class, sex, and age. The communities are prosperous ones and a high order of medical care could be expected.

Mertz found that the incidence of respiratory disease in each of the groups was similar regardless of whether or not the tonsils had been removed. Tonsillitis and sore throat accounted for 3 per cent of the total respiratory illness. In the 5- to 18-year-old group these two conditions were about one and one-half times as frequent in the children with tonsils as in those whose tonsils had been removed. After 19 years of age, the incidence was about the same in both groups. Disabling respiratory illness, that is, illness which caused an interruption in the usual daily work or activities, was similar in frequency whether the tonsils had been removed or not. After age 40, individuals with tonsils removed had a higher incidence of disabling respiratory illness.

The relation of T and A to the frequency of common respiratory infections was studied by McCorkle, Hodges, Badger, Dingle, and Jordan.[20] No differences were found in the age-specific as well as age-adjusted rates for common respiratory infections in children with and without tonsils.

During the course of the study, 26 children had their tonsils removed. A comparison of the actual number of respiratory infections for 3 years after tonsillectomy and the expected number of infections had they not been operated on showed that T and A did not materially alter the average incidence of respiratory infection in this group. The average rate among the 26 youngsters who were operated on had been higher than expected for several years before operation and continued to be higher than expected after operation.

Crookes[21] reported the results of T and A in 50 consecutive operations on doctors' children. The operations were performed over a period of 10 years or so and the results were judged by replies of the physician parents to a questionnaire. He found a reduction in the incidence of tonsillitis and sore throat, otitis media and deafness, cervical adenitis, colds, nasal obstruction, nasal discharge, chest infections, and cough. General health was improved in 35 out of the 50 children. The results are far and away the most favorable in the literature. The study suffers from the lack of a control group, failure to consider the age factor in the changing incidence of respiratory infections, and reliance on the reports of parents, often gathered several years after operation. If the study proves anything at all, it is that doctors are as gullible as anybody.

Otitis Media.—Reports of the effect of T and A on otitis media are inconclusive. During the 3-year period after T and A, Kaiser[17] found that otitis media was only about half as frequent as in unoperated children of the same age, but during the next 7 years those in the unoperated group fared as well as and even a little better than those operated upon. It is Kaiser's view that the operation benefited the younger children who were subject to otitis media.

Paton,[18] in his follow-up study in adolescent girls at a boarding school in England, concluded that the operation had an adverse effect on ear infections. Adenoidectomy increased the liability to acute purulent otitis media. Recurrent attacks were seldom prevented and primary attacks were more frequent.

In spite of the inconclusive results in the literature, every physician who responded to Wolman's survey listed recurrent or chronic otitis media as an indication for operation and 21.9 per cent recommended adenoidectomy alone.

Cervical Adenitis.—In Kaiser's experience, cervical adenitis was favorably influenced by operation. According to Paton, acute cervical lymphadenitis was more frequent in the operated children.

Rheumatic Fever.—Kaiser[17] concludes: "The surgical treatment of the tonsils, regardless of the age of the child, offers no certainty of preventing this infection and apparently does not reduce the number of recurrences. The clinical improvement in many cases has justified the operation, and the somewhat meager statistical data at hand in the Rochester study suggest that fatal carditis was noted less frequently in the tonsillectomized group."

It is no longer customary for pediatricians specially interested in rheumatic fever to recommend T and A as a routine prophylactic measure. Nevertheless, 34 per cent of the physicians surveyed by Wolman considered "tendency to rheumatic fever" as an indication for operation.

General Effects.—T and A had no influence on the weight of the girls in Paton's study. Girls of exceptionally low weight and height were as frequent among the operated as the unoperated groups. As for illness from all causes, the girls who had been operated on averaged somewhat more time lost from school (average, 20.6 days) than did those not operated upon (18.5 days).

Hearing.—Even the most conservative physicians regard a conductive type of hearing impairment as an indication for adenoidectomy. However, many years ago, Crowe and Burnam[22] pointed out that the operation for T and A was inadequate as a method for removing lymphoid tissue about the orifices of the Eustachian tubes or for preventing ear infections, and they advocated irradiation of the hypertrophied lymphatic tissue in the neighborhood of the Eustachian orifices. The patients were first operated on, since irradiation of the nasopharynx is not as satisfactory if carried out in the presence of large masses of lymphoid tissue.

Early reports[23] on the effects of irradiation on hearing were favorable, especially in children. These reports

failed to take into account the spontaneous improvement which takes place in untreated children.

Bordley and Hardy[24] studied the changes in hearing acuity following the treatment of nasopharyngeal lymphoid tissue by irradiation. They found that irradiation produces a better reduction in the lymphoid tissues and is more effective for this purpose than the usual adenoidectomy.

An improvement in hearing acuity took place in both the treated and control groups. The improvement was slightly greater in the treated group but it was not large enough to be statistically significant. The authors point out that if one depended on data assembled from the treated group alone (without a control group) a falsely optimistic interpretation of the results of irradiation might be made. They attribute the spontaneous improvement to the normal process whereby lymphoid tissue decreases as puberty approaches; to improved hygiene and care during infections, especially in the study group; and, finally, to the factor of experience in the use of the audiometer by repeated testing.

Evidently, then, even after meticulous reduction of retronasal lymphoid tissue by radiation, the effects on conductive-type hearing losses are equivocal.

Allergy.—Pediatricians, especially interested in allergy, are cautious in their approach to the T and A problem. Dr. Lewis Webb (loc. cit.) writes: "Removal of tonsils and adenoids is rarely indicated because of the allergic symptoms alone, i.e., hay fever, perennial rhinitis or asthma. In the main the indications are the same as for any child without respiratory allergy. Improvement of allergic respiratory symptoms does not usually follow operation except when a large adenoid mass is obstructing the retropharynx or when the adenoid is a focus of infection with continued or intermittent purulent nasal discharge. The tonsils and adenoids should never be excised in allergic children during the hayfever season. Removal at this time may favor the development of hayfever or, if the patient already has it, make it worse. According to my experience over the years, T and A will not prevent ordinary colds in allergic or other children."

Dr. Bret Ratner (loc. cit.) expresses similar views. "In an allergic child the tonsils and adenoids should not be removed until the allergic disease is well under control. Otherwise infection of regrown tonsillar and postpharyngeal lymphatic tissue will tend to precipitate asthmatic attacks or aggravate them. If the operation seems essential it should not be done in an allergic child during the spring and summer months prior to or during pollination."

Glaser[25] concludes, from a review of the literature and from his own extensive experience, that a T and A done during the pollinating season may lead to the development of bronchial asthma. The operation, when necessary, should be done during a pollen-free period. Any child requiring a second T and A is an allergic child. Young children, 3 years old or less, with obstructive nasopharynx, are allergic.

Dr. James C. Overall (loc. cit.) states: "About eight years ago, I reviewed the records of 100 consecutive children with asthma seen in private

practice who were sufficiently ill to warrant skin testing. For various reasons, 35 of them had T and A. Of the 35, 33 by my as well as the mothers' observations, were worse with their hayfever and asthma after the T and A. The indications for operation in allergic children are not too different from the non-allergic except that they require much more careful evaluation. Too many T and A's are done for 'colds' and for numerous other poorer excuses.''

HAZARDS OF T AND A

Mortality.—Cautious surgeons regard the operation for T and A seriously. McKenzie,[26] Surgeon at the National Throat, Nose and Ear Hospital, London, considers hemorrhage to be the greatest danger during operation. It is especially to be feared if there has been a recent throat infection or a peritonsillar cellulitis with secondary peritonsillar fibrosis. He cautions against operating on anyone whose temperature on the eve of the operation is over 99° F.

A danger during recovery from the anesthesia is asphyxia from falling back of the tongue. Hemorrhage continues to be a hazard for 24 hours after operation, rarely later.

Slater and Stephen[27] warn that anesthesia for T and A should not be considered a minor event. The responsibilities of the anesthetist are perhaps greater than with many other surgical procedures. They recommend having the patient come into the hospital the night before the operation, thus making a 2-day hospital stay. The greatest threat is anoxia. Sometimes the cause is cessation of respiration as a reflex response to the irritant vapor. Other mechanisms are obstruction of the larynx by dropping back of the tongue, a narrow aperture between the vocal cords, and reflex laryngeal spasm on withdrawal of the tube. They warn against the use of ethyl chloride which may induce respiratory and cardiac arrest. Before starting the anesthesia, loose teeth should be looked for and extracted, if possible, because of the danger of aspiration.

Dr. E. A. Rovenstine, Professor of Anesthesiology at the New York University Post Graduate Medical School, states (loc. cit.): ''Tonsillectomy during childhood is regarded by many as a minor surgical procedure and the task of providing anesthesia is often delegated to junior members of the anesthesia staff. This factor alone has contributed to the morbidity and the acknowledged, although low, mortality.

''The problems confronting the anesthetist during T and A are characteristic of all surgical manipulations that involve the respiratory airways. When these are attacked directly, as they are during tonsillectomy, it is the anesthetist's responsibility to protect the lower respiratory tract from obstruction and from aspiration of foreign material. At the same time he must provide a functioning airway that permits adequate, continuous respiratory ventilation. During tonsillectomy the anesthetist's efforts are handicapped by the presence of the surgeon's hands and instruments, as well as blood and secretions. Furthermore the degree of anesthesia requires the obtundation of pharyngeal reflexes to permit adequate and convenient surgery.

''Considerable patience, skill and time are needed to avoid the psychic

trauma engendered by a surgical operation in this age group. Frequently neither is available for reasons of economy in terms of time or income. The psychic distress produced by the operation is not often given its due importance in assessing postoperative morbidity.

"Anesthesia for tonsillectomy is by no means a minor procedure and the morbidity and mortality experienced every year is not insignificant."

In 1954, Beecher and Todd[28] reported the results of a cooperative study of death from anesthesia. The data, gathered during the 5-year period, 1948-1952, at 10 university hospitals scattered throughout the country, consisted of 559,548 anesthesias. The over-all death rate from anesthesia was 1:1,560. This includes cases in which anesthesia was a primary cause or a prominent contributing cause.

It is noteworthy that the study was made in university hospitals chosen for the excellence of their departments of anesthesiology. Had it been possible to obtain accurate data about anesthesias given by the less expert, in smaller centers, or in doctors' offices where the facilities for resuscitation are not readily available, the proportion of deaths would probably be considerably higher.

The highest death rate took place during the first decade. Though they received only 9 per cent of all the anesthesias, 20 per cent of the deaths were in children under 10 years of age.

McKenzie[26] states: "Before the late war the mortality (from T and A) cited for one London centre was 1 in 1,000 but figures do not accurately reflect the difficulties, nor do they record the conditions in small hospitals, where both surgeon and anesthetist may be less skilled than in a main centre." Wolman,[4] basing his conclusions on the replies of physicians to a questionnaire, estimates that the mortality from T and A is about 1 per 1,000 operations. In the United States during the nineteen twenties the number of deaths reported varied from 73 to 116 each year.[29] This amounted to about 15 per cent of all deaths from anesthesia. About the same number of children died each year in England where chloroform was widely used. Gale,[30] in 1951, estimated that about 80 children lose their lives each year in England and Wales as a result of the operation.

In 1954, at the Laryngological Section of the Royal Society of Medicine in London, the opening speaker[31] said that, in 1952, 47 deaths were attributed to tonsillar and adenoidal hypertrophy in England and Wales. In 42 of them T and A appeared on the death certificates. In 10 children, ranging in age from 8 months to 9 years, autopsy revealed, as causes of death, asphyxia from aspiration of blood, cardiac failure secondary to pulmonary collapse, overdistended lungs and mediastinal emphysema, and hemorrhage.

Accurate data on deaths from T and A have been compiled by Dr. Morris Greenberg, Director of the Bureau of Preventable Diseases, New York City (loc. cit.). In order to eliminate the possibility that deaths from T and A are concealed under other diagnostic categories, he investigated all deaths in children one to 14 years of age in New York City where the cause of death might conceivably be related to the operation. Included, for example,

in addition to T and A, were deaths from pneumonia, bronchitis, and heart disease. Deaths attributed to such conditions as accidents or cancer were not looked into. In all, 643 deaths were investigated. The charts of patients dying in hospitals were reviewed and notations on tonsillectomies performed during the previous 6 months were recorded. If a child died at home, the private physician was consulted.

Ten deaths were found. The death certificates had given the cause of death as hypertrophied tonsils and adenoids with mention of the operation in all but one child. There were 5 additional deaths in children who had had a tonsillectomy from 2 weeks to 3 months previously, but a causal relation between the operation and the death could not be definitely established. Greenberg's data indicate that, in New York City, deaths from tonsillectomy are accurately recorded, if deaths from hypertrophy of tonsils and adenoids are included as tonsillectomy deaths.

In the previous 5 years, 1951-1955, 46 deaths from tonsillectomy in children under 15 years of age were recorded in New York City. The total number of deaths from diphtheria, mumps, rubella, scarlet fever, typhoid fever, varicella, and whooping cough in the same period totalled 32. If all ages are included, there were 58 deaths from tonsillectomy and 45 deaths from the other diseases mentioned above.

In New York City, then, from 9 to 10 children under 15 years of age died each year from T and A during the past 6 years. An additional 2 persons, 15 years and over, also succumbed, making a total of about 12 deaths a year.

In Upstate New York, which includes all of New York State except New York City, 70 deaths from T and A were recorded during the 7-year period, 1949-1955, an average of 10 deaths a year.[3] Thus, for the State of New York, as a whole, the total number of deaths from T and A during recent years has been about 22 per year.

Mortality data for the United States, 1950-1955, are shown in Table V. In international listing, deaths are recorded under "Hypertrophy of Tonsils and Adenoids" with and without mention of tonsillectomy or adenoidectomy. Hypertrophy of tonsils and adenoids can hardly be considered a cause of death. Greenberg's study indicates that deaths listed under "Hypertrophy of Tonsils and Adenoids" are probably due to tonsil-adenoidectomy.

TABLE V. THE NUMBER OF DEATHS FROM "HYPERTROPHY OF TONSILS AND ADENOIDS" AND "TONSILLECTOMY OR ADENOIDECTOMY." UNITED STATES, 1950-1955*

	HYPERTROPHY OF TONSILS AND ADENOIDS†	WITH TONSILLECTOMY OR ADENOIDECTOMY‡
1950	339	305
1951	317	287
1952	346	304
1953	329	307
1954	254	236
1955	220	206

*Source: U. S. Vital Statistics, Dept. Health, Education and Welfare.
†International List No. 510.
‡International List No. 510.1.

The number of persons dying from the operation in the United States varied from a high of 346 in 1952 to 220 in 1955. There has been a notable drop in the number of deaths during the last 2 years (1954-1955) for which data are available.

The T and A death rates vary markedly from state to state (Table VI). New York, though the most populous state, has less operative deaths than California and Pennsylvania. The highest death rates are recorded for Iowa, Oklahoma, and Colorado. The 3 states with the lowest rates are Connecticut, Massachusetts, and Kentucky.

TABLE VI. STATES WITH HIGHEST AND LOWEST CRUDE DEATH RATES FROM "HYPERTROPHY OF TONSILS AND ADENOIDS." UNITED STATES, 1951-1955. (ESTIMATED FOR POPULATION AS OF 1950; STATES WITH POPULATION OF 2 MILLION OR OVER ONLY)*

DEATHS PER 1,000,000 POPULATION			
Highest Mortality States		*Lowest Mortality States*	
Iowa	3.7	New York	1.4
Oklahoma	3.6	Virginia	1.3
Colorado	3.5	Kentucky	1.2
California	2.7	Massachusetts	1.1
Mississippi	2.3	Connecticut	0.7

*Source: U. S. Vital Statistics, Dept. Health, Education and Welfare.

The distribution of deaths from "Hypertrophy of Tonsils and Adenoids" for the years, 1950-1955, by age is shown in Table VII. Eighty-one per cent of the deaths took place in children and adolescents under 20. The most hazardous time of life for the operation is the first 5 years. Although approximately 3 times as many T and A's are done during the 5- to 9-years age period as during the under-5-years age period (see Table III), the number of deaths in the 2 age periods is about the same. This means that the risk of a fatal outcome is about 3 times as great in children under 5 as in those 5 to 9 years old.

Hingson, Cull, and Witzeman[32] report a disproportionately high death rate from anesthesia among Negro patients of all ages. They call attention to the fact that the skin pigment makes it difficult to recognize cyanosis and pallor. No racial difference in anesthesia death rate was observed by Beecher and Todd[28] in their large series.

Poliomyelitis.—A relationship between bulbar poliomyelitis and tonsillectomy has been suspected for many years. One of the earliest to mention this phenomenon was Sheppard,[33] in 1910.

In 1928, Ayer[34] reported his observations on the relative frequency of bulbar poliomyelitis following tonsillectomy. At the same time, Aycock and Luther[35] were carrying out their extensive studies in Massachusetts and Vermont. Out of a total of 714 patients with poliomyelitis they were able to find 36 in whom the tonsils had been removed within a year of the onset of illness. In 16 of these the attack took place within a month after operation and 9 of these were bulbar. The high proportion of bulbar involvement so shortly after T and A led them to conclude that a causal relationship exists.

TABLE VII. THE NUMBER OF DEATHS FROM "HYPERTROPHY OF THE TONSILS AND ADENOIDS" BY AGE. UNITED STATES, 1950-1955*

	AGE—YEARS					
	UNDER 5	5-9	10-14	15-19	20 AND OVER	ALL AGES
1950	106	120	14	18	81	339
1951	105	111	23	15	63	317
1952	124	129	18	10	65	346
1953	122	135	19	12	41	329
1954	108	89	15	11	31	254
1955	86	86	14	2	32	220

*Source: Vital Statistics of U. S. Department of Health, Education and Welfare.

The conclusions of Ayer and of Aycock and Luther have been amply confirmed. Table VIII, adapted from Aycock,[36] summarizes the studies made by a number of different workers up to the time of his report in 1942 and shows the much greater susceptibility to bulbar poliomyelitis after a recent T and A. Of 170 cases of poliomyelitis occurring within 30 days after a T and A, 121 or 71 per cent were bulbar or bulbo-spinal. Of 45 cases occurring 30 to 60 days after operation the cranial nerves were involved in only 20 per cent.

TABLE VIII. THE TYPE OF POLIOMYELITIS FOLLOWING TONSILLECTOMY (AFTER AYCOCK[36])

	TONSILLECTOMY WITHIN 30 DAYS		TONSILLECTOMY 30-60 DAYS	
	NUMBER OF CASES	PER CENT	NUMBER OF CASES	PER CENT
Bulbar	99	58	8	18
Bulbo-spinal	22	13	1	2
Spinal	22	13	30	67
Nonparalytic	20	12	1	2
Unknown	7	4	5	11
Total	170	100	45	100

Additional epidemiologic evidence since Aycock's summary report has been published by Lucchesi and LaBoccetta[37] and by Siegel, Greenberg and Magee.[38] Lucchesi and LaBoccetta found that the tonsils and adenoids had been removed in a significantly high percentage of patients with bulbar and bulbo-spinal poliomyelitis. They regard loss of the tonsils and adenoids, regardless of the time of operation, as increasing the risk of cranial nerve involvement.

The study of Siegel and co-workers was based on 6,524 cases of poliomyelitis reported in New York City over the 6-year period, 1944-1949. Their careful observations showed that the percentage of bulbar paralysis was significantly higher than expected among post-tonsillectomized persons within one month after operation. The results from one to 5 months after operation were suggestive but not conclusive. There seemed to be no relationship 6 to 12 months after operation. They also found a higher case fatality rate during the first 2 months after operation. Their observations led them to conclude further that tonsillectomy predisposes to the development of the clinical symptoms of all forms of poliomyelitis. This was also the conclusion of Faber[39] and of Top and Vaughan.[40]

Further evidence of the relationship between T and A and bulbar poliomyelitis is revealed by the tragic case history of the K family, studied by Francis and his co-workers.[41] On Aug. 22, 1941, 5 of the 6 children of the K family in Akron, Ohio, were operated on for T and A. Four of the children also had teeth extracted. By September 5, 14 days later, the 5 children who had been operated on were acutely ill, they all shortly developed bulbar poliomyelitis and subsequently 3 of them died. The parents and the child who had not been operated upon remained well. At this time, Akron, a city of 270,000, was relatively free of poliomyelitis, only 2 cases having occurred prior to the onset in the K family.

After an extensive epidemiological study, the authors concluded that the source of infection was a cousin from a distant city with whom the children had visited several weeks before the onset of their illness. The K children were carrying the virus at the time of operation and the operation incited

invasion of the central nervous system in the 5 children while the unoperated child remained well. The operation seemed to transform a mild infection without clinical manifestations into a severe, highly fatal disease. They regard their observations as confirming the danger inherent in T and A during the season when poliomyelitis occurs even though it is not epidemic in a community.

Sabin[42] was able to produce bulbar poliomyelitis in monkeys by injecting virus into the tonsillo-pharyngeal regions. He found that the tonsillo-pharyngeal region is more sensitive to poliomyelitis virus than, for example, the abdominal cutaneous or subcutaneous tissues. Thirteen out of 16 monkeys, receiving virus injected into the tonsillo-pharyngeal region, developed disease of the nuclei of the cranial nerves, while these structures were affected in only 15 out of 250 monkeys injected elsewhere. He regards the high incidence of the bulbar type of the disease after tonsillo-pharyngeal injection as due to progress of the virus along the local peripheral nerves.

Because he was unable to produce poliomyelitis in monkeys by applying virus immediately to the operative wound, while the disease developed following injection into the tonsillar region, Sabin inferred that, in the human being, bulbar poliomyelitis would develop only when the virus was already present at the time of operation rather than as a result of postoperative contamination.

Septicemia.—In a recent paper, Rhoads, Sibley, and Billings[43] report positive blood cultures after T and A in 28 per cent of a group of 68 cases. The frequency of bacteremia was reduced by intramuscularly injected penicillin for 4 to 10 days before operation. No protection was afforded by shorter penicillin administration or by oral penicillin. Although, in their series, the organisms recovered were nonpathogens others have observed the onset of subacute bacterial endocarditis and septicemia after operation for T and A.[44] It is true that these are rare complications; but, when so many operations are done, the absolute number is probably sizable.

Psychologic Trauma.—In most instances, an operation for T and A represents the child's first separation from the home as well as his first admission to a hospital. Coleman[45] points out that the child, often through some ruse, is brought to the hospital where he is surrounded by strange, white-robed people. His reaction is one of terror and confusion. He is resentful at having been lied to and tricked and he is distrustful of his parents who have deceived him and are now deserting him. The operating room and the anesthetic intensify his terror and his sense of separation.

But even under the most favorable circumstances for a child to leave home and go to a hospital is a disagreeable and frightening experience. The psychologic reaction to the operative situation varies. It is true that most children forget their disagreeable hospital stay quickly and are none the worse for it. But a sizable proportion show alterations in behavior, principally fears, negativism, and family antagonisms. A consequence may be fear and distrust of doctors. Coleman regards the psychic trauma which some children sustain from tonsillectomy to be as much a complication as is postoperative hemorrhage or infection.

Langford[46] has observed that severe anxiety states may be precipitated by the shock of operation. In 6 out of 20 children suffering from anxiety states, the condition was definitely related to tonsillectomies under ether anesthesia. The child as a rule had been poorly prepared for the operation, the anesthetic, and the separation from the parents. The attacks began about a month after operation and 5 of the 6 children described them as being "just like having ether."

Levy[47] was impressed by the number of cases of fears, anxieties, and other symptoms which followed an operative procedure, usually a tonsillectomy. Out of a group of 124 children who had had operations, 25 (20 per cent) showed residual emotional disturbances. Although postoperative symptoms occurred at all ages, they were most frequent in the one- and 2-year-old groups. Levy attributes the greater reactivity of young children to their greater dependence on home and mother, their lack of experience outside the home, and their inability to comprehend what is taking place. In addition, they are poorly equipped to handle anxiety. Unlike older children, they are unable to play out their anxiety with toys, because they do not yet possess the words, concepts, and the skill required. For the young child an operation is a raw and brutal experience, the reason for which he cannot comprehend.

It is of interest that, in Levy's series, 13 of the 25 children who developed untoward reactions after operation had shown no deviations from normal behavior before.

The types of postoperative reaction most frequently observed by Levy were night terrors, fears, dependency, and negativism. Most of the children with night terrors were 18 months of age or younger. In this group the night terrors were all of long duration, extending over months or years. Negativistic reactions occurred principally in children 5 years old or older and consisted of such spiteful behavior against the parents as disobedience, temper tantrums, defiance, and destructive behavior.

Dependency reactions, consisting of clinging to the mother, refusing to leave her side, insisting on knowing where she is going and when she will return home, are so common after operation as to be considered normal. Occasionally, however, the manifestations may be exaggerated to an abnormal degree.

The most frequent fears in Levy's group related to darkness, doctors and nurses, and strange men. He attributes the fear which many children experience in the dark to fear of unknown things that may happen and to fear of being separated from the mother. This latter is directly related to the degree of dependency on the mother and, when severe, may lead to insomnia. The child who has been operated upon may find darkness bad since "they put you to sleep and then bad things happen to you."

THE COST OF T AND A

Only a rough estimate can be made of the cost of T and A to the nation since there are no accurate data on the number of operations performed and since methods of calculating hospital costs vary so widely.

T and A in a hospital requires a hospital bed for 1 or 2 days (1.3 days for children under 10 years, about 1.6 days for older children according to

the Metropolitan Life Insurance Company experience[48]), the time and skill of doctors, nurses, and anesthetists, auxiliary help, use of the operating room, and use of equipment and materials. Since the operation is an elective one it is not performed—in New York City at any rate—on week ends or holidays. Therefore beds for T and A are used only 5 days a week or, taking into account holidays, about 250 days a year. Moreover, now that operations are not done during 4 months, June through October, beds for T and A patients are actually used only two thirds of 250 days or about 167 days. Another consideration is that, since the operation is no longer done during the summer months when general pediatric wards are apt to be light but, instead, during the winter months when the beds are likely to be filled with children having infections, the pressure on bed space is greater than ever.

The data of Siegel, Greenberg, and Magee[9] can be used to calculate the hospital space necessary for T and A in New York City in 1949. A total of 53,007 T and A's were done in hospitals. If each child required 1.3 days of hospital stay, this means 68,909 hospital days. At the rate of 167 hospital days per bed per year, it would require the equivalent of a 400-bed hospital merely to care for T and A patients in New York City.

In view of these considerations it does not seem excessive to calculate the cost of a tonsillectomy—regardless of who pays for it—at $100. At this rate the cost of the 53,007 T and A's in New York City, in 1949, would be about $5,300,000. This sum does not include the sizable number of operations done out of the city and in doctors' offices. In 1949-1950, the entire budget for the New York City Health Department was $16,756,329. The people of the City of New York paid for T and A's about one third as much as for maintaining the city health department.

If this sum is prorated for the country as a whole and we assume 1,500,000 tonsillectomies a year, which means that about 40 per cent of the population has T and A's—a modest estimate—the sum for the country as a whole would be $150,000,000.00.

The Ministry of Health estimates the cost of T and A in Britain at 3 million pounds ($8,400,000) or about 15 pounds ($42) per operation.

The great frequency of T and A is regarded by some as due, in part, to the financial greed of physicians. This may be true in isolated instances but it is not an important general consideration. In England, where the surgeon under the National Health Service gets no fee for service, the operation is as popular—perhaps more popular—than ever. And here, in the United States, the children of physicians seem to be operated on as often as the children of others.

DISCUSSION

Before undertaking any form of treatment the benefits to be expected must be weighed against the risks. There is hardly a therapeutic procedure that is free from a certain amount of danger. The use of this or that agent—or none at all—must be decided by balancing desirable against undesirable effects. In instances where the patient is desperately ill, where

the outlook is grave, where the treatment may be lifesaving, even though the procedure is hazardous, its use is generally regarded as justified.

Even here grave errors have been made. Until recently the routine use of high concentrations of oxygen was regarded as essential and harmless for small premature infants. The disastrous effects of the overuse of oxygen in this group are only too well known. Retrolental fibroplasia, a direct consequence of oxygen therapy, had become the first cause of blindness in preschool children. Now that oxygen is used much less frequently and in lower concentrations, not only has blindness on this basis disappeared but we find that premature babies are getting along as well as they did formerly. It is evident that the value of oxygen for the premature infant was greatly overrated. The iatrogenic production of blindness in premature infants stands, along with the psychologic neglect of babies in institutions and the consequent high death rate, as a major error in pediatric history.

In the case of T and A the available evidence points to no benefit whatsoever from the operation in the overwhelming majority of children. Yet it is a hazardous procedure and the data presented here indicate that it is a significant cause of death in children. Here is a "disease"—tonsil-adenoid enlargement or infection—with virtually no mortality, and a therapeutic procedure for it which has a sizable mortality.

The relation of T and A to bulbar poliomyelitis and possibly to other forms of poliomyelitis should make us cautious of the hidden dangers which lurk in any therapeutic procedure. Only a few years ago we learned that transfusion in certain girl babies, by rendering them sensitive to Rh-positive cells, made it practically impossible for them ever to have normal children; and even more recently the transmission of serum hepatitis by transfusion was discovered.

A further example of hidden dangers is the relation between radiation of the upper thorax—often for "enlarged thymus"—and carcinoma of the thyroid in children.[49]

The danger of bulbar poliomyelitis after T and A has been greatly reduced by deferring operation during the months when the disease is prevalent and possibly by immunization procedures. It is quite conceivable, however, that the operation opens the way for other neurotropic viruses with different seasonal incidences. Where the benefit to be conferred by operation is so small the possibility of unsuspected hazards must always be kept in mind.

Almost every active practitioner who cares for children can point to youngsters who have improved in one respect or another following T and A. In some it has been an abrupt cessation of troublesome colds, in others a desired weight gain, in still others relief of obstruction, or termination of a series of otitic episodes. Unfortunately coincidence is a mischievous prankster. We remember the occasional, spectacular success; the numerous failures are forgotten.

At present there is no reason to believe that the incidence of colds is significantly reduced by T and A. Kaiser's observations, made in the 1930's, showed a slight advantage to

the operated children during the 3 years after operation but no essential difference over a 10-year follow-up period. No difference in the incidence of respiratory disease was found by Gafafer, Paton, Mertz, or McCorkle and co-workers.

Obstruction—in the nasopharynx or throat—may be an occasional indication for operation. The frequency of allergy as a basis for the obstruction, especially in children under 5 or 6 years old, is insufficiently recognized and should be carefully considered before operation is undertaken. It seems wise to wait until the child is 5 years or older because of the tendency for obstructive manifestations to diminish as the child grows, because the risks attendant upon the operation are relatively great in young children, and because of the adverse psychic effect. It is significant that Kaiser,[17] who takes a more tolerant attitude toward the operation than more recent students of the subject, does not mention obstruction as an indication.

All students of the T and A problem agree that the operation reduces the incidence of tonsillitis and sore throat. However, these illnesses account for only 3 per cent of all acute respiratory diseases.[19] It is common experience to see children have repeated attacks for one or 2 winters and thereafter be relatively free of them. Moreover these infections generally respond readily to antimicrobial therapy.

The findings of Paton[18] that the occurrence of purulent otitis media is favored by adenoidectomy should make one cautious about T and A in children with this troublesome ailment.

The carefully controlled study on conductive-type hearing defects by Bordley and Hardy[24] has removed what is generally regarded as an important indication for T and A. Their laborious observations were made at the same institution where Crowe worked. Crowe found that adenoidectomy failed to remove lymphoid tissue about the orifices of the Eustachian tubes completely and he therefore advocated irradiation after operation. Even after this double procedure, Bordley and Hardy were unable to demonstrate that the improvement in hearing was significantly greater than in control, untreated children.

Too little attention is paid to the finding of Mertz that, after age 40, when health is more precarious than earlier and time lost from work more important, the incidence of disabling respiratory illness in males is higher in the operated than in the unoperated.

The careful studies in the literature, although showing beyond doubt that, by and large, T and A has no favorable influence on the health of children, cannot be interpreted as proving that the operation does not help in certain isolated cases. The operation is performed so frequently and for such trivial reasons that, in any study, the casually decided upon cases far outnumber the children in whom there may be some real indication for surgery. Consequently any real benefit to individual children is obscured.

Bass,[30] in 1934, reported a series of 150 children, in the great majority of whom he had himself decided on the indications for operation and had chosen the surgeon and anesthetist. The most frequent indications for operation were frequent colds, tonsillitis, nasal obstruction, otitis, and cervical adenitis.

One hundred thirty-three of the 150 children seemed to have benefited in one respect or other from the operation. In 7 the results were questionable and in 10 there was no improvement. Bass concluded that the operation has a favorable influence on otitis media and "sinusitis." Nose colds seemed as frequent after operation as before but were not as severe. Rheumatic fever was not benefited.

Among unfavorable sequelae were a 5-year-old girl with unexplained fever for 5 weeks, a 6-year-old girl with a lung abscess requiring operation and transfusion, an 8-year-old girl with otitis media going on to mastoiditis and operation, and a 12-year-old girl with putrid necrosis of the lung. All patients recovered. Despite the skill of the surgeons, 6 children required a second operation.

Bass estimates that about 10 per cent of all children would benefit by T and A. Even when the indications are carefully weighed and the operation is limited to this small group, and even when the operation is performed by well-trained surgeons assisted by well-trained anesthetists the results are not impressive, sequelae are not infrequent, and regrowth of adenoid tissue sufficient to require reoperation takes place.

Fry,[51] an English general practitioner, has recommended 40 children from his own practice for T and A over a period of 10 years. This represents 5 per cent of the children under his care. The principal reasons for operation were recurrent otitis media in 24 children, recurrent attacks of tonsillitis in 10, and parental pressure that could not be resisted in 6. In his experience the 95 per cent of children who were not operated on did not in any way suffer because of it.

The physician will do well to recommend against operation except in very special instances. Certainly there is no urgency about excision of tonsils. No one claims that the operation is lifesaving. Now that antimicrobial agents are available, the discomfort of sore throat and otitis media and the threat of mastoid diseases are quickly and effectively handled. On the other hand, there is a definite risk in the operation, as there is in every operative procedure and in every anesthesia.

Medical practice has erred often in the past. In good part, improvement in medical practice can be accounted for by the discarding of useless and harmful procedures as well as by the adoption of beneficial ones.

The continuance of the practice of indiscriminate T and A is indeed an enigma. We live in a medical era which considers itself "scientific." We like to think that we have rid ourselves of the mumbo jumbo and mystical nostrums of the past and we adopt new procedures only after rigorous testing. Yet T and A, whose uselessness, in the overwhelming majority of instances, has been repeatedly and convincingly demonstrated, retains its popularity with the laity and the medical profession. Would we, on the basis of such tenuous evidence as is available in favor of T and A, adopt a new drug which may be lethal for some 300 persons a year?

SUMMARY

1. Data from various parts of the United States and Britain indicate

that tonsil-adenoidectomy is probably performed as frequently now as in former years.

2. Numerous studies reported in the literature fail to demonstrate any benefit from the operation.

3. Ample data demonstrate a causal relation between tonsil-adenoidectomy and bulbar poliomyelitis.

4. The number of persons recorded as dying from the operation in the United States during the years 1950-1955 varied from 220 to 346 a year.

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Comments on Current Literature

PREPARATION OF THE HEMOPHILIC PATIENT FOR SURGERY: USE OF ANTIHEMOPHILIC GLOBULIN

The success or failure of surgical treatment in patients with hemophilia depends largely upon the maintenance of a reasonable level of coagulability immediately preceding and following surgery. Since a deficiency of antihemophilic globulin (type A hemophilia, sex-linked in inheritance) accounts for from 75 to 80 per cent of reported cases of hemophilia,[1] care of this type of hemophilic subject has received considerable attention in the literature. The minimum blood level of antihemophilic globulin compatible with effective hemostasis is given as approximately 30 per cent of the average normal plasma level. Hemophilic patients vary in the initial level of antihemophilic globulin in their blood and in the ease with which this level can be raised.[2] Since the AHG activity is increased appreciably by transfusions of fresh blood or plasma, temporary elevation of the AHG blood level of the recipient by this means has been the accepted procedure for improving hemostasis and preparing the hemophilic patient for surgery. Raising the level above 30 per cent of normal for a period covering 24 to 48 hours following surgery is considered essential if postoperative bleeding is not to be excessive.[2, 3] However, certain factors limit the effectiveness of this means of bleeding control. The stability of human AHG is unpredictable, and, in some instances, the transfused blood or plasma may be of little value by the time it is received. While small transfusions of whole blood or plasma will raise the blood level of AHG appreciably (1 to 5 per cent), actually relatively large volumes are required to bring the level to 30 per cent of normal. Maintenance of an effective level is made more difficult by the fact that the half-life of AHG averages from four to eleven hours following administration.[2-4]

These problems, in addition to that of suitable donors for transfusion and of successful storage for maintenance of AHG activity (storage at –30° C., preferable), have resulted in a concerted effort to obtain antihemophilic globulin from sources other than human blood or plasma, which could be prepared and standardized in such a way as to assure a constant supply, of predictable effectiveness and free from serious antigenicity or toxicity. Until recently, such preparations have had the major disadvantage that they were highly antigenic. Within the past few months a number of reports has appeared describing the use of animal AHG in the treatment of patients with hemophilia and in the preparation of the hemophilic patient for surgery, including dental procedures.

The earliest preparations used therapeutically in hemophilia consisted of certain fibrinogen fractions separated from human blood by the Cohn process. While in experienced hands some of these early preparations seemed to give satisfactory results, the lack of a reliable method at that time for the assay of AHG meant that the activity of the preparation could not

be estimated. Many of these preparations were ineffective or were given in inadequate dosage. The development of more practical methods for the assay of AHG has been reviewed recently by Rosemary Biggs[2, 4] of the group of investigators at the Radcliffe Infirmary, Oxford, England. She stresses the need for checking the fractionation processes at every stage, and states that in "judging the dose of AHG, it is clearly important to have some reasonably reliable method for its measurement."[2] As this author points out, most of the methods used have depended upon assessing the ability of a given sample to correct the abnormality of hemophilic blood, such as the prothrombin consumption test, or the partial thromboplastin time. More recently, the thromboplastin generation test was used by Pitney,[5] and a modified prothrombin consumption test by Wolf.[6] Each of these tests has been shown to carry some disadvantage. The direct assay method originally described by the Oxford group[7] was considered sufficiently reliable, but is somewhat difficult to standardize and to interpret. Biggs now describes a method similar to that of Pitney which she and her colleagues consider of practical value in the controlled therapy of hemophilic subjects. The method "consists in carrying out the thromboplastin generation test on normal and haemophilic $Al(OH)_3$-treated plasma, and on mixtures of the two in known proportions."[2] Since the samples are mixed and tested undiluted, no provision of factor V is required, this factor being present in both whole-plasma samples. According to the instructions given for mixture and dilution, the dilution curve can be constructed with reasonable ease, and the hemophilic samples tested in less than one hour's time. While the method is not precise, as compared with the earlier Biggs-Macfarlane procedure, it is proposed that this method may prove more readily adaptable for use in laboratories not particularly devoted to work on blood coagulation. The author states that this procedure has proved of great value in the controlled therapy of hemophilic patients. "It appears that the level of AHG is a safer guide to the haemostatic efficiency of AHG than is the prothrombin-consumption test."[2]

A recent report by the Radcliffe Infirmary group[3] presents the results in thirteen hemophilic patients requiring surgery or dental extraction, who were prepared for the surgical procedure and were followed closely in the postoperative period. Animal antihemophilic globulin and human plasma preparations were used. For some years this group of investigators had been impressed with the problem of minimal safe blood levels of AHG, the rate of its destruction in the hemophilic circulation, and by the magnitude of the problem of AHG supply, which must be available for management of the known hemophilics, and for emergencies. Studies on animal AHG, particularly from ox and pig blood, its extraction and preparation, had been under way for some years before the present patients were treated. This material varies in potency from one aliquot to another, but the best preparations were shown to have an activity about 8,000 times that of the same weight of fresh human plasma-protein. However, contamination with fibrinogen and other proteins renders it antigenic, which limits the duration of treatment with a particular animal preparation to from 10 to 14 days and prevents any later use of the same material in the same patient. The first clinical trial with bovine AHG was reported in 1954 by Macfarlane, Biggs, and Bidwell.[8] The subjects of this preliminary clinical trial were three hemophilic patients in need of dental extraction who volunteered to receive treatment with full knowledge that the preparation was still in the experimental stage. All necessary dental extraction was carried out immediately following the administration of

the bovine preparation. The results were encouraging: in two of the three patients there was virtually no bleeding after extraction, the tooth sockets healed promptly and completely, and no ill effects arising from the administration of animal protein could be detected. The third case was that of a patient who had been under long-term treatment for a convulsive disorder; this patient showed on admission a lower platelet count than that usually found in hemophilic subjects. In this instance the administration of bovine AHG resulted in a marked thrombocytopenia which persisted for two weeks, but no purpuric manifestations were observed. Treatment with AHG in this patient had been stopped after four days. Nevertheless, the extraction of sixteen teeth was accomplished with remarkably little bleeding. Subsequent investigations revealed that bovine AHG does contain an agglutinin for human platelets, and the toxicity and fate of the injected animal antihemophilic globulin are discussed in some detail in a separate publication by two members of the group, Sharp and Bidwell.[9] Shortly after the preliminary trials in 1954, a serious emergency occurred[3] in which the use of animal AHG was a lifesaving measure. A young hemophilic man, accidentally shot at close range, suffered extensive wounds of the back and left elbow. After three weeks of repeated transfusion this patient was transferred to the Radcliffe Infirmary. The problem was complicated by the fact that he had been sensitized to bovine AHG by the previous administration of a hemostatic agent derived from ox blood (Coagulen). This patient was carried successfully through the necessary surgery by the use of pig AHG. Under hemostatic control by this means, the wounds in the back were grafted with skin removed from the thigh, and a traumatic brachial arteriovenous aneurysm which had developed in the elbow was resected.

The thirteen new patients reported recently,[3] and a fourteenth patient requiring surgery for acute intestinal obstruction, who was admitted to the hospital after the present report had been submitted for publication, were all emergency cases. The authors strongly advocate reserving treatment with animal AHG for such emergencies, since risk of anaphylaxis would deprive the patient of its aid in some possible future crisis. Most of the hemophilic patients treated by this group have been managed by the use of human AHG, or by transfusion. As indicated, the fourteen patients in the present series were dental or surgical emergencies. Many of these patients had a long history of bleeding—hematemesis, melena, hematuria—and some were crippled from repeated hemarthroses. One was a 19-year-old man who had been injured three weeks before in a motorcycle accident and whose face and scalp wounds failed to heal. During this period the patient had received 28 pints of blood and 5 liters of plasma in an attempt to control the persistent bleeding. Under treatment with human and pig AHG, plastic surgery of the face and scalp was accomplished with good result. Likewise, a boy of 15 years was able to undergo surgery involving the removal of laminae from twelve vertebrae for the treatment of a massive extradural clot.

In these patients, antihemophilic globulin concentrated from bovine or pig blood was administered in an average dose of 200 to 400 mg., equivalent in activity to about 2,500 ml. of fresh human plasma. In no case was there abnormal bleeding while the level of AHG in the blood was above 30 per cent of normal. There was, however, among the patients considerable individual variability in the dose required to maintain this level. In the case of clean wounds, the temporary elevation of the AHG level by one or two injections might be followed by complete healing without

hemorrhage; in large or infected wounds bleeding might recur, should the AHG level fall below 30 per cent. In all cases, rapid healing took place during AHG treatment. The authors state that these AHG preparations are definitely antigenic, although in most instances mildly so. Skin tests, as a rule, are negative, and no antibodies active against the AHG used could be demonstrated in the recipient's blood. In a detailed study of this aspect by Sharp and Bidwell,[9] the fate of the animal AHG was determined by fluorescein-conjugated antisera. Evidence was obtained which suggests that the protein fraction is concentrated in the wound fibrin of the recipient. In two summary articles,[2] one a presentation before the Section on Medicine, Royal Society of Medicine, Biggs outlines details of the assay of AHG, tests for its potency in AHG preparations and in the patient's blood, with emphasis on the management of the hemophilic patient.

In the light of their experience the Oxford investigators stress the value of animal AHG, at the same time emphasizing the necessity of caution in its use. Hemophilic patients referred for surgery should be evaluated carefully. Where actual surgery is required, but where the areas of expected hemorrhage are superficial, or readily accessible, control of bleeding may be accomplished by mechanical means alone. In the case of certain surgical procedures, in which healing may require only two or three days, the use of adequate amounts of human plasma is suggested, reserving the animal AHG for possible future use. In the case of major surgical procedures in which bleeding areas may be extensive, the use of AHG from bovine or pig blood is recommended. Since antigenicity manifests itself in from ten to fourteen days as a rule, the specific animal AHG used should be discontinued at this time, or before, if signs of antigenicity are apparent, with change to the other animal AHG or to human plasma or AHG concentrate. No cross-antigenicity between bovine and pig AHG has been observed. In some instances a combination of animal AHG and human plasma was administered. These workers recommend that assay of the AHG level in the patient's blood be carried out before treatment and at frequent intervals during convalescence from surgery; they advise special care in order to prevent excessive movement or inadvertent trauma of affected parts following surgery, including the use of special dressings, protective devices for the gums in the case of extensive dental procedures,[10] etc. The authors look forward to the "production of a highly potent, non-antigenic antihaemophilic factor . . . which, like insulin and other animal organ extracts, might be active without causing sensitisation."[3]

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Correspondence

[The letter of Dr. Tabrah in the issue of last December has brought considerable correspondence to the Editor's desk. Several of the discussions follow.]

To the Editor:

I have been following your correspondence and the editorials concerning the pleasures and the displeasures of pediatric practice. For seventeen years I have done general medical work. This year, at 46, I am giving up a lucrative practice, a lovely office and forfeiting my savings to take two years of training as a pediatric resident. As the years have passed all of my dealings with the adult patient have grown more and more boring. At the same time my fascination with children, sick and well, has grown. It had not occurred to me that there were those in pediatrics who found no pleasure in anything other than the so-called "interesting" cases, the pediatric problem cases, etc. I had not conceived of pediatrics as being divided into the interesting work of the academician as contrasted to the dull monotony of general pediatric practice. In my own practice my metamorphosis from general work to pediatrics has been brought about by a process of natural selection. I recognized long ago that the trivialities constituted a large part of pediatric practice. This makes it no less interesting or, if you will, any less worth while. I have always felt that it kept me more on my toes—alert to the fact that a fever may be due to a cold, but that it might bear watching lest it bode something more fearful. Personally, I could not bear the strain of constantly being personally responsible for the care of a host of seriously ill and dying "interesting" cases. The laughing, rowdy well child who is brought in only for his polio shot is a delightful part of the practice of pediatrics.

Perhaps formal training in pediatrics in some institutions gives to its students the concept that pediatrics deals only with fascinating illnesses in children. Experience in general medical practice instills another concept, namely—pediatrics deals mostly with well children or those whose illnesses are trivial. I am sure of this. I have records which will substantiate it. Parent counseling, well-child care, community work in affairs of children, management of trivialities—these things take up more of the average practicing physician's time than the diagnosis and treatment of the medically exotic. The doctor who does not find all of these things interesting is bound to find the general practice of pediatrics boring.

Reasoning along these lines I have refused to allow myself to be discouraged in my plans. The first article which appeared in *Medical Economics* along these lines only made me more determined to pursue a delayed career. The crepe which has been hung in the pages of the journals has left me cold.

Perhaps I am wrong—I will let you know in about two and a half years!

KEITH HAMMOND, M.D.

Paoli, Ind.

To the Editor:

I have read and reread the letter from Dr. Frank L. Tabrah. I agree with you that the "dissatisfaction" in Dr. Tabrah's case probably lies more in his own personal characteristics than in what constitutes present-day pediatric practice, and that this is true in many other instances. His letter, however, brings up some questions relating to practice and to education and training not answered by Lee Hill's statement, from the standpoint of the "Board," nor by my editorial.

Dr. Tabrah is obviously in earnest about the matter, as have been several young pediatricians who have discussed with me

similar dissatisfactions. One wonders what their motivation was in choosing pediatrics as a specialty and why it was that they had not realized the nature of the work they would be doing until after they had actually entered practice. It is not likely that their basic personality could be greatly altered by the type of medical education they got nor by their hospital training except in so far as their attitudes and sense of values were influenced by the character of their teachers. But is it not possible that pediatrics could have been presented to them in such a way, somewhere along the line, that they would have had a clearer picture of what to expect from practice, and could not the well child and the factors which influence his total health and welfare be so presented that this would be a fascinating field full of challenge to an intelligent and inquiring mind? If this had been done for Dr. Tabrah he could hardly have written "Well babies still frequent the pediatrist's office, but it is inconceivable that any physician with intelligence and interest in the unusual can long survive the routine of playing grandmother for years on end in a well-baby practice," or make the statement about "the boredom of viewing the medical world from the inside of a diaper," or of making prospective pediatricians aware about the "enforced preoccupation with trivia largely unrelated to disease" in pediatric office practice. There are plenty of examples of affective teaching that could have changed this attitude. I think of the newborn. Nearly all newborns are normal and yet when the subject is properly presented and interest stimulated it opens up an immense field for investigation. In recent years such investigation has led to a great deal of valuable new knowledge. There is still much to learn about children of every age group. Interesting phenomena are by no means all associated with disease. The basic facts of all aspects of growth and development are appreciated only by knowledge of the normal. The whole field of child welfare centers around this knowledge. It is quite clear that improvements in education and training along this line are needed. In other words it is the child himself who needs to be appreciated by the physician if he is to derive full satisfaction from pediatric practice.

Another feature of education and training which could be helpful in preparing prospective pediatricians for the type of practice they must expect to have is greater and more effective use of outpatient departments. In many training centers this facility has been inadequately used. The hospital wards with their bizarre and unusual cases and difficult diagnostic problems are featured. The trainee needs this training but he also needs to see the more common and ambulatory patients and to have equally good supervision and teaching in regard to these patients as he gets on the wards. Only rarely is this the case, and he goes into practice expecting the kind of patients he learned about on the wards. He is unhappy because he seldom encounters them and is ill-at-ease in the presence of the more common problems about which he has had little training.

Most pediatricians adjust to this situation in practice rather quickly and spontaneously, largely, I believe, because of personal characteristics and inherent interests and values. The results of the survey published in *Medical Economics* last November indicating that two-thirds of the practicing pediatricians were satisfied with their choice of a specialty bears out this fact. However, the dissatisfaction of the other third needs thoughtful consideration. Dr. Tabrah's letter points out some of the problems that face us. One is economic in nature; the high financial overhead of maintaining an office can be met only by seeing large numbers of patients, and this assembly-line type of practice robs him of most of the interesting and rewarding features of pediatrics. The result is boredom and frustration. Neither the pediatrician nor his patients benefits adequately from such practice. Furthermore, he has little if any time to devote to such self-improvement activities as teaching and hospital staff duties and assignments. He finds himself in a competitive merry-go-round without academic status and a minimum of specialist or consultant status, unless he has, by good fortune, had training in a pediatric subspecialty.

ARTHUR H. PARMELEE, SR., M.D.
Los Angeles, Calif.

To the Editor:

Pediatrics: Its Own Reward?

"The reward of a thing well done," wrote Emerson, with economy of words, "is to

have done it.''* This quote, Mr. Editor, introduces my two cents' worth into the discussion sure to be elicited by Dr. Frank Tabrah's letter in the December issue of the JOURNAL OF PEDIATRICS. Poor Dr. Tabrah withdrew, rather than retired, from the private practice of pediatrics at an early age, because, in Hamlet's phrase, it seemed to him weary, stale, flat, and unprofitable. Now I am sure that, like myself, Dr. Tabrah must agree with Dr. A. H. Parmelee, Sr., that no one goes into pediatrics to get rich. That disposes of Hamlet's last adjective.

But to Dr. Tabrah, ''Pediatric medical office practice is not enough; there are too many private pediatric practices being started today that will be abandoned from sheer boredom.'' And earlier in his letter the doctor writes ruefully, ''A few years ago this colorless job was relieved by challenges of frequent and severe disease, and the physician was called upon to exercise his greatest ingenuity.''

Why not say, ''Pediatrics and preventive medicine have been altogether too efficient. 'Fie upon this quiet life! I want work!' '' (Shakespeare again.)

Dr. Tabrah says, ''There are no longer enough surprises in the package.'' And his general implication is that simplification of infant feeding, greater knowledge of vitamins, of antibiotics, have reduced him and his bored colleagues to ''preoccupation with trivia largely unrelated to disease.''

Now, boot-licking editors has never paid off. But here's an accolade to you for having the imagination to reprint in your column Dr. Parmelee, Sr.'s excellent editorial from the *Bulletin of the Los Angeles Children's Hospital*, on ''Pediatric Rewards.'' Pediatrics needs men like Dr. Parmelee, who can see ''the spirit pushing in a blade of grass . . .'' or in a normal child. Pediatricians are needed who can individualize, to whom each upper respiratory infection is a *ding an selbst*, to whom unthinking routine is anathema. We must be able to stop short in the midst of office hours with scheduled appointments, to spot a newly born infant with hitherto unsuspected congenital dislocation of the hip, or to ''run down'' a heart murmur which may have been missed, leading perhaps to the discovery of an operable lesion.

*''The New England Reformers.''

Excitement? In every field, in every age, it is born of responsibility. The engineer at his throttle, the captain on his bridge, the pitcher on his mound, the mother beside the crib, the health commissioner in the midst of an epidemic, all must and do often feel the excitement of a job well done for those who depend upon them, of mistakes avoided which could so easily have been made. In pediatrics especially, experience itself can be exciting if one is determined that past mistakes shall not be repeated, that future babies shall benefit rather than suffer from them.

Annoyances? Who can deny that in pediatrics these abound, and in perfusion? Chief of these, of course, is the ever-ringing, never-convenient telephone. Worst of all, the irritation incidental to it must *not* be transmitted to the anxious mother whose confidence in the doctor has led her to call him in the first place, and whose question is not trivial to her, although it may sound so to him.

Thirty-five years of telephonic exhaustion, plus undue interest in teaching and writing, led, or forced, me to retire from the *private* practice of pediatrics at the early age of 64. ''Disgruntled?'' (to use Dr. Tabrah's word). Yes—with my own inability to adjust to the unavoidable; but not with pediatrics, nor with babies, nor even with their clamorous elders.

But bored? Impossible! Dr. Tabrah waxes graphic over the ''boredom of viewing the medical world from the inside of a diaper.'' To answer him in kind, I have always found diapers quite absorbing, and early learned from Dr. Holt, Sr., the importance of their contents.

Happily for me—and this is pertinent only as it indicates that my pseudo retirement has no etiology in ennui nor in lack of interest—I continue in the department of pediatrics at Washington University and work half-time in the clinic at Homer G. Phillips Hospital and as director of its Department of Pediatrics. Children's Hospital Conferences, plus a well-baby clinic, round out my week. I am seeing more infants and children than I ever did in private practice. The remuneration accorded the above has served to make my door at least unattractive to the ''wolf.''

By Professor George Herbert Palmer's standard,* a pediatrician is indeed a professional man: "Every sound professional man, every sound teacher at least, is engaged in his work for the fun of the thing. . . . 'To this end was I born and for this cause came I into the world,' said the greatest of Teachers. . . . The compensation of the professional man is measured by his inner outgo, and not like the tradesman's by his external income. . . . Conscious of our powers, we see in some profession an opportunity to exercise them, and to it we turn with an eagerness which gives zest to severe toil."

PARK J. WHITE, M.D.

St. Louis, Mo.

[The following letter was too lengthy to publish in full. Excerpts have been selected by the Editor.]

To the Editor:

I agree that present-day child-care medical training facilities offer little to prepare either general practitioners or pediatricians for the office care of children. Training is weighted on the side of the unusual, particularly unusual physical deviations. The importance of this training is not to be minimized, but it is unfortunate that dealing with new and unfolding life is not made to seem important and exciting. It is also unfortunate that pediatricians go out only superficially trained and stimulated to fulfill their role in simple everyday well-child care. The distaste is understandable because most of the teaching is done by those who are only interested in the physically ill child. The child is too often seen as an interesting disease rather than an exciting unfolding personality living in a family constellation. As a result, many young men while in training have never seen a pediatrician in any other role than as a bedside consultant. This phase of child care has been aggrandized to the exclusion of the pediatrician's important role in shaping the oncoming generation through well-child programs.

The public's and our interest has largely been on the physical side, but the public also warmly responds to whatever we will offer on the side of preventive psychiatry. Few psychiatrists have had an opportunity to put their theories to a test in everyday living experiences with the growing child in a family constellation. Yet increasing numbers of pediatricians are learning from experience that certain principles in the area of emotional development have a predictable verity just as principles we have come to take for granted in physical care have a predictable, constant validity.

To have a new life in a new family entrusted to one's care is an ever-changing, ever-exciting, highly varied, and challenging experience if one sees life to be intrinsically interesting. Who else has the enviable position of the pediatrician? The general practitioner spreads himself too thin to ever become oriented to a really comprehensive well-child program. If the pediatrician sees many very ill children, their care will soon be at the expense of his well-child program. Therefore, perhaps ideally, many men are needed to care for a large number of well and a relaitvely small number of sick children.

Maybe the specialty as it is taught from the ivory tower represents only a small fraction of the real role of the pediatrician in society. I hope to be privileged to care for the physical ills of children in the future, but, if I do not, I will look forward to endless discussions with endless mothers, and every new mother and every new child will afford endless surprise packages to keep life interesting for me.

Dr. Tabrah's letter is thought-provoking and valuable. I think we need periodical reappraisals of our roles. Especially we need to help our young men know that their training experience is not a picture of future practice. Few who seek that role will have an opportunity to fulfill it, but out in the stream of life there are satisfactions and adventures never thought of during the years of training. I hope I have lifted the curtain a little so that those who are interested may see a little of a side of pediatrics that probably no training program could adequately provide.

I like the work I do.

CHARLES A. TOMPKINS, M.D.

Omaha, Neb.

*Palmer, G. H.: Trades and Professions, Houghton Mifflin Co., 1915, pp. 14, 15.

News and Notes

The following diplomates were certified by the **American Board of Pediatrics, Inc.**, at Boston, Massachusetts, December 6, 7, 8, 1957.

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Dr. Jerome Bernstein, 542 Maplewood Ave., Bridgeport, Conn.

Dr. James Edgar Boyland, 9416 Byeforde Rd., Kensington, Md.

Dr. Sidney Brodie, 24 O'Rourke Path, Newton Centre, Mass.

Dr. Paolo B. Bucci, 104-19 102nd St., Ozone Park, N. Y.

Dr. William Roderick Buchanan, Jr., 86 High St., Greenfield, Mass.

Dr. V. Jane Smiley Burgoon, Matson Ford Rd., Conshohocken, Pa.

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Dr. Harold Patrick Charbeneau, 708 Monitor-Leader Bldg., Mt. Clemens, Mich.

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Dr. Sumner Root Ziegra, 2 West Shore Drive, Massapequa, N. Y.

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Dr. Horacio Padilla Muñoz, Av. Niños Heroes No. 961, Apto. 1, Guadalajara, Jal., Mexico

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Handbooks on Fluoridation Available for Community Use.—To aid in community education on water fluoridation, the Committee to Protect Our Children's Teeth, citizens' group headed by Dr. Benjamin Spock, is making available two handbooks.

Our Children's Teeth is a 104-page digest of expert opinions on various aspects of fluoridation, designed to serve as a handy basic reference source. Authors include Dr. Herman E. Hilleboe, New York State Health Commissioner; Dr. H. Trendley Dean, Secretary, Council on Dental Research, American Dental Association; Dr. Thomas Parran, Dean, Graduate School of Public Health, University of Pittsburgh, and former Surgeon General, U. S. Public Health Service; Dr. Robert A. Kehoe, Director, Kettering Laboratory; Dr. Reidar F. Sognnaes, Professor of Oral Pathology, Harvard University, and Dr. Detlev W. Bronk, President, National Academy of Sciences.

The volume includes a statement by leading American authorities on human nutrition,

an explanation of the chemistry of fluorine by the nation's foremost chemists, a chronology of the fluoridation movement, summary of experience in major cities, a statement on the legality of fluoridation and a roster of national organizations supporting the measure.

Gains and Setbacks is a digest of experiences in more than thirty communities, designed as a guide in the planning of a public education campaign. It includes articles by public health authorities and experts in mass communications as well as a U. S. Public Health Service report on the status of fluoridation throughout the country, a summary of court action on the measure and a comprehensive directory of source material.

Both books may be ordered from the Committee to Protect Our Children's Teeth, 105 East 22nd Street, New York 10, N. Y. *Our Children's Teeth* is priced at $1.00; *Gains and Setbacks* is priced at $1.50.

The **Third International Congress of Allergy,** sponsored by the International Association of Allergology and French Allergy Association, will be held in Paris, France, Oct. 19-26, 1958. The program will consist of symposia on asthma and emphysema, immunology, recent clinical advances, biochemical aspects, autoimmune reactions, dermatology, and socioeconomics aspects; sectional papers, limited to 10 minutes, on any phase of allergy; and round table conferences on selected subjects led by international authorities.

For all information regarding the program and papers to be presented, please write to:

United States and Canada: Dr. Samuel M. Feinberg, 303 East Chicago Ave., Chicago, Ill.

Latin America: Dr. José M. Quintero Fossas, Paseo 313, Vedado, Havana, Cuba.

Europe and other countries, and for Congress information and registration: Dr. Bernard N. Halpern, 197 Boulevard St. Germain, Paris 7, France.

The **Harvard Medical School** announces a postgraduate course in general pediatrics, June 2-13, 1958, and in pediatric metabolism and endocrinology, June 10-13, 1958, at the Burnham Memorial for Children, Massachusetts General Hospital, under the direction of Allan M. Butler, M.D., and Nathan B. Talbot, M.D. Enrollment may be for the entire course, or for the last four days. For further information, write to Assistant Dean, Courses for Graduates, Harvard Medical School, Boston 15, Mass.

The **Department of Pediatrics, Baylor University College of Medicine,** Houston, Texas, and Division of Maternal and Child Health, State of Texas, March 10, 11 and 12, 1958, will conduct a Pediatric Symposium at the Texas Children's Hospital Auditorium, Texas Medical Center, Houston. Guest speakers to participate will be: Robert A. Aldrich, M.D., of Seattle, Louis K. Diamond, M.D., of Boston, Robert A. Good, M.D., of Minneapolis, Jack Metcoff, M.D., of Chicago, Robert E. L. Nesbitt, Jr., M.D., of Albany, N. Y., and Douglas N. Buchanan, M.D., of Chicago.

Books

Rio Grande Medicine Man. M. K. Wylder, M.D., Santa Fe, N. Mex., 1958, Rydel Press, 186 pages. Price $3.75.

This is an unusually interesting and, in many ways, a fascinating book. Dr. Wylder, of Albuquerque, respected and admired by his pediatric colleagues throughout the country for his work for children in New Mexico, has written some of his reminiscences of an active practice of over fifty years. It is, however, much more than an interesting and at times amusing collection of incidents and stories. Parts of it are real Americana. It reflects, moreover, the philosophy and work of a physician who represents the finest type of practitioner. Without the author ever

calling attention to it, the reader senses the code of the physician's duties and responsibilities to his patients by which he has lived, his tolerance for and understanding of human weaknesses, and his sympathy for the unfortunates. The book has been brought out locally by the author, but it deserves a much wider reading. Lay readers as well as physicians will enjoy it. Some of our social workers may be a little shocked by his activities in placing children for adoption, but knowing Dr. Wylder we doubt if any social agency has ever had a better record of satisfactory placements. His reference to the 7-month premature babies who, in seclusion, gain 4½ pounds in the first month of life, brought back some memories of similar phenomena in our own practice, which, like Dr. Wylder, we had wiped out of our minds. This is an example of "abnormal growth" not found in any textbook, nor inquired into by the Board. To many present-day practitioners, who resent a house call only a few blocks away from home, Dr. Wylder's description of some of his trips into the mountains in his early days of practice will be almost unbelievable. Yet we are sure that he has had a much fuller, richer, and happier medical life than most of the men in practice are having today.

B. S. V.

The Volunteer. David L. Sills, Chicago, 1958, The Free Press, 320 pages. Price $6.00.

A report of the Bureau of Applied Social Research of Columbia University. The author in an attempt to find the motivations, attitudes, and reactions of the volunteer membership and workers in a national health agency selected the National Poliomyelitis Foundation for study and analysis. In its concept and scope therefore, the study is limited to one segment of the thousands of volunteer workers in health organizations. This makes the title misleading, as it is not a general study of the "volunteer," but rather a study of the volunteer worker in the Polio Foundation. This takes away from its importance as a social study, as valid general conclusions applicable to "The Volunteer" cannot be drawn from a study limited to a single organization. Although rather verbose, the report is of interest to physicians. A careful editing of the material combined with considerable cutting would have made for better reading. There is inadequate discussion of some important matters that concern the volunteer, as for example of the emotional attitude of the "polio volunteer" created by the type of publicity developed by the "corporate organization," or central headquarters of the Foundation. This, beyond question, has had a tremendous influence on the reactions of the volunteer worker at the chapter level and has been a subject of discussion among the volunteer workers of other health agencies with objectives involving diseases of greater medical importance than poliomyelitis. While it may give a fairly accurate picture of the volunteer worker in the Foundation, his motives and attitudes, its findings must be interpreted with caution and reservation if the attempt is made to look upon them as reflecting the volunteer worker in all agencies as the title implies. In the interviews with "polio volunteers," which are given in considerable detail and selected by the author, organization comparison favorable to the Foundation is very much emphasized. This left the reviewer with the feeling that the author was not entirely objective in the study, presentation of the report, and conclusions, as similiar critical comparisons, but unfavorable to the Foundation, undoubtedly would have been made if the volunteer workers in some other health organization had been interviewed. Complete objectivity is an essential attitude in a study or report if it is to be of any value or importance beyond propaganda. As the report will in all probability be referred to frequently in the coming months, these limitations as to the scope and value should be kept in mind.

The Incurable Wound and Further Narratives of Medical Detection. Berton Roueché, Boston, 1957, Little, Brown & Co., 177 pages. Price $3.50.

To those who are unacquainted with his previous book, *Eleven Blue Men*, let it be said that Mr. Roueché is perhaps the best writer of our times when it comes to presenting medical topics to a lay audience in an interesting and accurate way. The subtitle "narratives of medical detection" describes his method or form of presentation. The present volume is a collection of a half

dozen stories that have appeared in the *New Yorker*. The story of "The Incurable Wound," relates the discovery of the transmission of rabies by bats in the United States. "The Most Delicate Thing in the World" is a splendid description of the work of the Poison Control Centers established in many cities in the last four years, and fine publicity for the crusade against accidental poisoning started by the pediatricians. The story of the side effects of cortisone in producing manic-depressive symptoms in a man given the drug for the treatment of periarteritis nodosa, is one of the most vivid pieces of descriptive medical writing we recall. While written by a layman, it belongs in the group often referred to as "compulsory reading" for the medical student and practitioner. The medical profession is fortunate in having a writer with the ability to present intricate medical subjects to the public, not only accurately and ethically, but in a form that makes fascinating reading. It is highly recommended for the physician as well as for lay reading.

B. S. V.

The Dermatologists' Handbook. Ashton L. Welsh, Springfield, Ill., 1957, Charles C Thomas, 426 pages.

This is a comprehensive, clear, up-to-date manuscript of great value not only to the dermatologist, but also to those physicians engaged in related specialties, particularly the pediatrician, the internist and the general practitioner. The first portion of the book contains detailed descriptions of the many drugs employed in topical applications to the skin and mucous membranes. It stresses the indications for and usages of lotions, ointments, creams, powders, wet compresses and other modalities employed for relief and aid to the inflamed or diseased skin surface. The descriptions of the sources of various medicaments, their incompatibilities and their sensitizing properties are rightfully stressed.

The second portion of the book is of equal importance because it deals with the systemic and prophylactic therapy of dermatologic disorders. It describes the close relationship of the skin to other organs in that disturbances of certain systems may be manifested by skin lesions and conversely that dermatoses of long duration and epidermal infections may produce systemic effects. An important lesson stressed by the author is that the dermatologist must have thorough knowledge of s y s t e m i c physiology and disease and of their relationship to the skin.

An extensive review is given of the numerous drugs used orally or parenterally for systemic effect and a chapter is devoted to the description of adverse reactions produced by certain drugs.

C. W. L.

Radiology of the Alimentary Tract in Infancy. Roy Astley, M.B., M.R.C.S., D.M.R., London, 1956, Edward Arnold (Publisher) Ltd., 287 pages. Price $10.00.

This publication is a noteworthy contribution in the rapidly advancing field of pediatric radiology. It should serve the pediatrician, pediatric surgeon, and radiologist equally well, being as it is a compendium of information relating not only to the gastrointestinal tract but also to the adjacent structures and viscera. Descriptions of the normal are purposely omitted, the net result lending itself to either quick reference or more leisurely perusal. The subject material, of course, ranges from lesions of the pharynx and esophagus distally segment by segment to the anus, and "while the main concern is the baby during the first year of life, there is not infrequent excursion into the second year or even later when it illustrates some practical point" (e.g., duplications, pneumatosis intestinalis). The author has interested himself specifically in the esophagogastric junction and diaphragm, one of the more controversial of subjects among pediatricians, surgeons, and radiologists, taking issue for instance with Neuhauser and Berenberg on the subject of chalasia. His views on such entities as rumination, pylorospasm, congenital esophageal varices, chylous ascites, and partial thoracic stomach—to mention a few—are always informative and challenging although not uniformly acceptable. In brief, this volume should be available to all physicians attempting the management of diseases of infancy.

H. A. H.

Editor's Column

THE JOURNAL OF PEDIATRICS EDUCATIONAL FOUNDATION

A corporate organization of the Editorial Board, *The Journal of Pediatrics Educational Foundation,* has been chartered under the Missouri nonprofit organization law. Its purpose is to simplify and facilitate the handling of the *Journal of Pediatrics Fund* established by the publishers of the JOURNAL, as announced in the issue of last December, and whose use "for the furthering of pediatries" is the responsibility of the Editorial Board.

The educational purposes of the Foundation have been broadly stated and permit the use of its funds for Lectureships, Fellowships, medical research, etc., in the field of pediatries, as may be decided upon by the Editorial Board.

The By-laws of the Foundation provide for three Directors. Two of these are appointed by the Board and one by the publishers. Their function is to manage the Foundation funds, keep records and accounts, and make expenditures as instructed by three Trustees. The Trustees are appointed by and must be members of the Editorial Board. Their function is to carry out the use of the Fund as decided upon by the Board as a whole.

The following appointments to the Foundation have been made:

Directors: By the Editorial Board, Alexis F. Hartmann, Borden S. Veeder.

Directors: By the Publishers, Joel A. Rogers.

Trustees: By the Editorial Board, Harry Bakwin, Stewart H. Clifford, and Waldo E. Nelson.

The business address of the Foundation is 3207 Washington Blvd., St. Louis 3, Mo.

Professor Niilo Hallman, chief-of-service at the Children's Hospital, Helsinki, Finland, has accepted the invitation of the Foundation to visit the United States for a month in the early Fall of this year. He will be the Visiting Lecturer for a week at clinics in four different cities. The Trustees are working on the selection of additional clinics to which pediatricians from Canada and the United States will be invited as Lecturers.

THE T & A ENIGMA

IF the question were asked as to the value of the T & A operation, most pediatricians would reply that they had seen it help some children greatly, but that its widespread and indiscriminate use was regrettable. They would say, further, that it was only indicated in children who were carefully selected and who had been under observation for some time. The older men would

probably add they were glad the days were over when the operation was almost a routine procedure and parents were led to believe that every child must have the tonsils out.

It is just here, as Bakwin points out in this issue (page 339), that they would be wrong. Herein lies the "enigma." His figures show that, despite the many studies pointing out the uselessness of indiscriminate tonsillectomy and the dangers associated with the operation, it is still an extensively and unnecessarily used procedure.

Where does the fault lie that leads to such "bad practice" continuing is the important question. Is it perhaps that the pediatric staffs in our medical schools are so interested in and occupied with the rare and esoteric that they are not interested in and are bored by the plebeian ailments of children, and thus the sound teaching that the practioner needs is neglected? It is rather shocking to find that the studies reporting on the uselessness of and the dangers associated with the T & A operation have had so little effect.

HYPOGLYCEMIC CONVULSIONS AND THE ALLERGIST

FORBES[1] has pointed out that galactosemia, a metabolic disease resulting from a congenital inability to metabolize galactose, may in early infancy be confused with allergy to cow's milk and must at times be considered in the differential diagnosis of such allergy. The first communication concerning this in medical literature other than the original observation of Forbes appeared recently by Wilhelm.[2]

The purpose of this communication is to direct the attention of those interested in allergy to another metabolic disease, even less common than galactosemia, which should be borne in mind if convulsions due to allergy to cow's milk are suspected in early infancy. Cochrane and associates[3] described for the first time convulsions in infants secondary to hypoglycemia sometimes of familial origin precipitated by the feeding of an amino acid in excess of a critical amount. The circumstances of these cases were such that a pediatrician familiar with the fact that convulsions might, on some occasions, result from allergy to foods would probably have suspected that as the cause. This is especially true since ACTH and cortisone are said to exert a favorable effect in some of these infants.

Cochrane and associates described three infants, two of them sisters, hospitalized at the ages of 2½ months and 4 months, respectively, because of convulsions which occurred after cow's milk feedings had been substituted for breast milk. Allergy must have been suspected in the second of these infants because a soybean milk was tried, but the convulsions persisted. A biopsy of the pancreas in the first case showed only some edema. A third child was hospitalized at 5 months because of convulsions which took place under the same circumstances. Biopsy of a resected portion of the pancreas showed about four times as many islets as normal. Glucose tolerance tests in all three cases were normal. In the first two, the father had a history which was compatible with that of hypoglycemic convulsions, and in the third a maternal uncle had "fits" of

undetermined origin. Two unrelated infants with this condition, one familial and one not, are now under study at Genesee Hospital.[4]

While these infants would fall into the general group of spontaneously occurring hypoglycemia described by McQuarrie,[5] in these particular infants it was discovered that the amino acid, leucine, produced marked hypoglycemia resulting in convulsions. Breast milk contains 161 mg. per cent of leucine, cow's milk contains 356 mg. per cent, and one of the popular soybean milks used in this country contains 220 mg. per cent.[6] For purposes of diagnosis, a casein test meal or a leucine test meal may be used although the latter is much more palatable and probably more accurate. In Cochrane's studies, casein was used in the proportion of 1.5 Gm. per kilogram of body weight and leucine 0.15 Gm. per kilogram body weight (equal to the amount of leucine contained in the standard test dose of casein). I would like to suggest that should the infant begin to show evidence of convulsing on such a test meal, this tendency could be quickly corrected by the intramuscular injection of 10 per cent dextrose,[7] although oral administration should be adequate if it is started early enough and the infant is able to swallow.

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